ABSTRACT SECTION

0. FORESTS, FORESTRY, AND THE UTILIZATION OF FOREST PRODUCTS: GENERAL

For general *regional* accounts see section 90

TRANSLATIONS

See Nos. 1818, 2169–70, 2280, 2304, 2377, 2403, 2412.

0 (02). HANDBOOKS. MANUALS. TEXTBOOKS

1334. HEGER, A., SCAMONI, A., and GÄBLER, H. Leitfaden für den Forstfacharbeiter. **[Manual for the technical forest worker.]** Deutscher Bauernverlag, Berlin. 1953. pp. 347. [G.] Price *DM*8·50.

A handbook presenting comprehensive information under 4 main heads: forest botany, management, utilization and protection.

0 (048.1). BIBLIOGRAPHICAL LISTS

See also Nos. 1452, 1574, 1802, 1861, 2179, 2242, 2258, 2423.

1335. HUGHES, K. W., YODER, R. A., and WEST, W. I. **Forestry theses accepted by colleges and universities in the United States 1900–1952.** Oregon State College, Corvallis, Ore. 1953. pp. 140.

A list of titles, arranged chronologically under institutions, with an author index and short subject index.

0 (05). PERIODICALS. YEARBOOKS. DIRECTORIES. ALMANACS, CALENDARS, DIARIES

See also No. 2423.

1336. ***Journal d'agriculture tropicale et de botanique appliquée.*** Muséum National d'Histoire Naturelle, 57 Rue Cuvier, Paris V^e^. Monthly. Price (outside France) *Fr.*2000 p.a. P.R.

The first part—Vol. 1, No. 1/4—of a journal succeeding *Rev. int. Bot. appl. Agric. trop.*, which ceased publication with No. 373/374 in December 1953. Abbreviation in *Forestry Abstracts*: *J. Agric. trop. Bot. appl.*

1337. ***Schweizerische Beiträge zur Dendrologie.*** Schweizerische Dendrologische Gesellschaft, Zürich. Price *Fr.*4·50 per issue.

A new publication, first issued in 1949, since when one part has appeared each year, size varying from 36 to 84 pp. The editor is Prof. A. U. Däniker, Director of the Zürich Botanical Garden. Abbreviation in *For. Abstr.*: *Schweiz. Beitr. Dendrol.*

1338. ***Monthly Bulletin of the Iranian Forest Service.*** Ministry of Agriculture, Teheran. Monthly.

Text wholly in Persian, but table of contents in English and French. Vol. 4, 1953/54, contains ca. 275 pages. Abbreviation in *For. Abstr.*: *Mon. Bull. Iran. For. Serv.*

1339. ***Michigan Wood Technology.*** Department of Wood Technology, University of Michigan, Ann Arbor, Mich. P.R.

Nos. 1 and 2, published in March, 1954, contain 2 and 3 pages respectively. Abbreviation in *For. Abstr.*: *Mich. Wood Technol.*

1340. REICHENSTEIN, E. Internationales Hand- und Adressbuch für Forst- und Holzwirtschaft, Jagd und Naturschutz. Teil I: Kanada. **[International manual and directory for forestry and the forest products industries, game and nature protection. Part I: Canada.]** Bundesanstalt für Forst- und Holzwirtschaft, Reinbek bei Hamburg. 1953. pp. [4] + 220 + 8 maps. 62 refs. [G.] Price *DM*8·75.

A complete revision, for Canada, of Pt. I of F. Grünwoldt's 'Internationale Adressbuch für Forstwirtschaft, Holzwirtschaft, Jagd und Naturschutz' (1938) giving the organization and addresses of official institutions (Dominion and provincial), associations and commercial organizations. A list is appended of journals and serial publications covering this field, and supplementary matter includes summarized statistics, a general account of forest distribution and types, notes on the forest products industries and the most important tree species. There is an index.

0 - - 011. TERMINOLOGY. NOMENCLATURE

See Nos. 1346, 1454, 1457–8, 1466, 1484, 2107–8, 2112–3.

1. FACTORS OF THE ENVIRONMENT. BIOLOGY

11. SITE FACTORS: CLIMATE, SITUATION, SOIL, HYDROLOGY (WATER AND SOIL CONSERVATION)

111. *The Atmosphere. Meteorology. Climate and Microclimate*

111.2. Radiation and Temperature

1341. FAIRBAIRN, W. A. **Difficulties in the measurement of light intensity.** *Emp. For. Rev.* 33 (3), 1954 (262–9). 16 refs.

Factors causing variations in light intensity are discussed and the author describes the difficulties he has encountered in measuring light intensity in the forest by two methods—photopile and photographic photometers.

111.5. Wind

See Nos. 1756–8.

111.8. Climatology. Climate and Microclimate.

See also Nos. 1536, 1545, 1621–2, 1756–8.

1342. Division de climatologie. **[Department of climatology.]** *Rapp. Inst. nat. Étude agron. Congo belge 1953*, 1954 (158–75). [F.]

By the end of 1953, the Belgian Congo had 37 established ecoclimatic stations with 12 new ones prepared for operation in 1954. Tables present a number of ecoclimatic factors, mainly for Yangambi, 1953, in various arrangements. These include rainfall (25 years); max. and min. temperatures, sunshine (14 years); saturation deficit (6 years). Other factors under observation are vapour pressure, evaporation, radiation, soil temperatures (at 6 depths), wind speed, relative humidity and atmospheric pressure. One table presents 6 factors as means of 5-day periods through 1953.

1343. Pasák, V. Mikroklima porostního okraje, zabuřenělé holiny a černého úhoru. **[Microclimate of the fringe of a stand, a weed-covered blank, and a clean fallow.]** *Lesn. Práce* 33 (9), 1954 (387–92). [Cz.]

Presents graphed and tabulated results of meteorological measurements (air and soil temperature, wind velocity and direction, relative humidity, and total evaporation) conducted in 1953 in a natural blank near Čížová (Czechoslovakia): (1) at the fringe of the neighbouring Spruce stand (4th age class); (2) in the middle of the blank, covered with 1-m.-high *Calamagrostis epigeios*; and (3) in a clean fallow. The thermo-isopleth curves in July were: in (1) of the regular U shape, the minima occurring at ca. 2 p.m.; in (2) slightly distorted U curves, a layer of hotter air being observed at 5–45 cm. height above ground; in (3) very irregular, the maximum temperature occurring at the soil surface about 1–2 p.m. In an early dry spring (early March), under a cloudy sky, the surface temperatures at noon were 2·4, 0·6 and 2·9° C. for (1), (2) and (3), respectively; and temperatures at a height of 5 cm., were 3·2, 4·4 and 3·6°. The stand affected both the velocity and direction of the wind. Tables are given for (1), (2) and (3) showing the relative air humidity on one day at 6 a.m., 3 p.m. and 8 p.m., at heights of 5, 30 and 100 cm.; total daily evaporation at different heights, and illumination of the soil surface.

1344. Papp, L. A tarvágás hatása az erdö mikroklimájára. **[The influence of clear cutting on the microclimate of the forest.]** *Erdészeti Kutatások, Budapest* 1954 (1), (45–54). [Hu.] From *abstr.* in *Hung. agric. Rev.* 3 (3), 1954 (7). [E.] C.G.B.

Presents the results of one-day measurements (24 Aug., 1951, 9 a.m.–7 p.m.) in two stations: (1) a middle-aged Oak stand, and (2) an adjacent, recently clear-cut area. At 1 m. height, the air temperatures in (1) averaged 1·2° C. lower than in (2); at 2 p.m., the relative humidity was 20·5% higher in (1) than in (2), but by 7 p.m. the air in (1) became drier than in (2); the soil temperature (on the surface and to a depth of 30 cm.) was much higher in (2) than in (1).

1345. Babos, I. A magyarországi erdök tájhatárolása. **[Division of Hungarian forests into regions.]** *Erdö* 2 (3), 1953 (253–64). [Hu.]

The division of Hungarian forests into 50 regions has recently been completed by the Erdészeti Tudományos Intézet (Scientific Institute of Forestry) conjointly with forest officers, botanists and pedologists. The results are recorded on a sketch-map with descriptive commentary, the regions being tabulated for mean Jan.–July temperatures and annual and seasonal (April–Sept.) precipitation. The work was handicapped by lack of any reliable guide to the natural distribution of indigenous species in Hungary, for which purpose the dwindling numbers of Oak and Beech and the sporadic occurrence of *Pinus sylvestris* are quite inadequate. It was found possible to adapt the methods used by Mroczkiewicz in Poland [cf. *For. Abstr.* 14 (No. 1872)] to Hungarian conditions, the regional division being based on the following: (1) As a fundamental, the type, composition and mode of regeneration of existing forests etc. (2) The divisions so obtained were modified in accordance with Szánthó's climatic curves and the limits of regional distribution of agricultural soils as established by Kreybig and Stefanovits. Although the agricultural soils map never comprehended forest soils, the regional division of agricultural vegetation (almost identical with the previous two lines of division) was valuable. (3) Final modifications using Zsolyomi's floristic regions.

To avoid excessive fragmentation, the following were regarded as single entities: (*a*) Forest areas having virtually identical soils and climatic characteristics. (*b*) Areas under forest, or to be afforested, having virtually identical climatic conditions and with soils of different types but of similar properties. (*c*) Mountain regions forming a single geographical unit, irrespective of differences in soil and climatic conditions. (*d*) Certain special regions forming islands of differing soil, climatic and topographical conditions. (*e*) Areas of little forest use or suitable only for planting (agricultural) shelterbelts, or for agricultural purposes. If the regional figures for Jan.–July mean temperature variations (m.t.v.) and those for the annual and seasonal (April–Sept.) precipitation are compared with the climatic requirements of various species (e.g. m.t.v. for Larch, 18·3° C.; minimum rainfall 800 mm. and maximum mean July temperature 16° C. for Spruce), areas for raising plantations to be grown on a longer economic rotation can be chosen with fair confidence. A summary is appended of the work that can be expected to follow in each of the 50 regions.

114. *Soil. Soil Science*

1346. Jacks, G. V. **Multilingual vocabulary of soil science.** F.A.O., Rome. 1954. pp. vii + 439. [E.F.Span.] I.F.B.

Terms are arranged by subject in 22 sections and are numbered serially within each section. Each term is defined in each of the 8 languages (English, French, German, Spanish, Portuguese, Italian,

Dutch, and Swedish), and there are alphabetical indexes of the terms defined for each language.

114.1. Soil Physics

See also Nos. 1505, 1621–2, 2020–1.

1347. **Some field, laboratory and office procedures for soil-moisture measurement.** *Occ. Pap. Sth. For. Exp. Sta.* No. 135, 1954. pp. 47.

Contains the following papers: Procedures and equipment for determining soil bulk density (*W. M. Broadfoot*; pp. 2–11; 2 refs.). Relation of soil bulk density to moisture content as it affects soil-moisture records (*K. G. Reinhart*; pp. 12–21; 5 refs.). Core vs. bulk samples in soil-moisture tension analysis (*W. M. Broadfoot*; pp. 22–5; 3 refs.). Devices to facilitate King-tube soil-moisture sampling (*E. R. Ferguson* and *W. B. Duke*; pp. 26–9). Terminal panel for electrical soil-moisture instruments (*B. D. Doss* and *W. M. Broadfoot*; pp. 30–1). Phone-jack terminals for soil-moisture units (*F. Woods* and *W. Hopkins*; pp. 32–3). Comparison of laboratory and field calibration of fiberglas moisture units (*C. A. Carlson*; pp. 35–42; 6 refs.). A core method for determining the amount and extent of small roots (*C. A. Carlson*; pp. 43–7; 4 refs.).

1348. Mařan, B., and Lhota, O. Pohyb půdní vlhkosti v lese r. 1947. **[Soil moisture variation in forests in 1947.]** *Práce výzkum. Úst. lesn. ČSR* No. 3, 1953 (39–70). 14 refs. [Cz.cz.russ.e.]

Presents the results of measurements of soil moisture during the drought year 1947: (1) under a pure, even-aged Spruce stand (90–95 years); (2) at the eastern edge of this stand; (3) in the centre of a large clearing; and (4) under a 20-year-old Larch plantation, planted in rows, with grass cover. The locality was near Kutná Hora (Bohemia), alt. 400–470 m., precipitation 680 mm., and mean annual temperature 7·8° C.; the soil was strongly podzolized, over gneiss. Under (1), the soil moisture decreased very rapidly particularly from the onset of the long August drought until November; in the A horizon and the root zone it fell below 5 and 8% respectively. Moisture content increased with increasing depth until at 1·20 m. it was unaffected. The shedding of Spruce needles set in earlier and was more intense on soils of small physiological depth. Under (2), the drying of the top layers set in sooner, was more intense and lasted longer than under (1). Under (3), in a soil overgrown with grasses, bog-moss and rushes, the drought had no effect on soil moisture up to August; in the lower layers indeed, the moisture content rose. Only later did the water table fall by 40–50 cm. with some drying of the upper layers. Under (4), in the root zone, and particularly in the A horizon and the sod layer, a steep drop in soil moisture was observed during the period May–Nov., and the moisture content always increased with depth.

The soil moisture in the root zone fell, in general, to ca. $\frac{1}{10}$ (in the most favourable cases to $\frac{1}{4}$) of normal. The results of measurements confirmed the great importance of physiological soil depth and degree of degradation, particularly for podzolic soils. The level of the water table and soil capillarity played the decisive part.

1349. Sokolov, D. F. O vlijanii uvlažnenija počv na intensivnostj vydelenija CO_2 pri razloženii lesnogo otpada. **[Influence of soil moisture on the rate of CO_2 evolution during the decomposition of forest litter.]** *Dokl. Akad. Nauk SSSR* 95 (6), 1954 (1317–20). 9 refs. [Russ.] [Institut Lesa Akademii Nauk SSSR.] A.P.B.

[Cf. *For. Abstr.* 15 (No. 2197.] Plots under 15-to 16-year Oak/Ash on a shallow, heavy clay-loam chernozem at the Derkul experiment station were stripped of their natural litter and covered on 16 June 1952, at a rate equivalent to 20 metric tons/ha. of air-dry substance, with (1) Oak leaves, (2) 1 : 1 mixture of Oak and Maple leaves, (3) 3 : 1 mixture of Oak and *Caragana arborescens* leaves, or (4) left without litter, as control. From 19 Aug. to 17 Sept. 1953 daily measurements were made between 8 and 9 a.m. of CO_2 evolution from 0·05 sq. m. plots under 16-litre glass jars (buried to 5 cm. of their height), from each of which 20 litres of air were exhausted at a rate of 1 litre/3 min. The period was dry, with low soil moisture and relatively high air and surfaces oil temperatures. Results, shown in tables and graphs, indicate the following mean values for CO_2 evolution in kg./ha./hour: 19–31 Aug.—(4) 5·75, (3) 4·99, (2) 4·74, (1) 4·22; 1–8 Sept. (with lower air and surface soil temperatures)—(3) 7·84, (2) 7·06, (1) 6·68, (4) 5·78. At 15 months from the start of the experiment a check was made on the dry weight and carbon losses %; this gave values of (dry wt. and C, respectively): (2) 80·5, 82·0, (3) 67·5, 74·7, (1) 67·7, 71·8%. On 8 Sept. the plots were watered to bring the remaining surface matter to 58–61% and the soil, wetted to 15 cm. depth, to 31–33% moisture content. This treatment was followed by a sudden rise in CO_2 production, the mean values for the ensuing 8 days being (3) 17·72, (2) 14·33, (4) 12·70, and (2) 12·28 kg./ha./hour.

The results of measurements of CO_2 production at 4-hourly intervals on 28–29 Aug. and 10–11 Sept. are shown in a graph. Despite difference in levels before and after watering, the courses of the individual curves are similar. They show maximum CO_2 production in the morning or day hours, and a minimum at night. The sole exception was the control before watering, which for unknown reasons showed a maximum at 4–5 a.m.

1350. Shibamoto, T., and Inoue, Y. **[A new simple type of thermistor and its application for measuring soil temperature.]** *J. Jap. For. Soc.* 36 (9), 1954 (247–9). 4 refs. [Jap.jap.e.]

A new type of thermistor made by the alloy electro-deposition method was studied. A soil thermometer [illustrated] containing this type of thermistor was designed and used to measure temperature on sand dunes under different soil cover. [Results are shown in graphs with English legends.] *From authors' summary.*

114.2. Soil Chemistry

See Nos. 1351–2, 1354–5, 1358, 1503, 1505, 1509, 2020.

114.3. Soil Formation. The Soil Profile and its Development. Litter, Humus, etc.

See also Nos. 1348–9, 1354–5, 1357, 1360, 1366–7, 1399, 1504–5, 1521, 1525–6, 1584, 2042, 2572.

1351. SCHNITZER, M., and DELONG, W. A. **Note on relative capacities of solutions obtained from forest vegetation for mobilization of iron.** *Canad. J. agric. Sci.* 34 (5), 1954 (542–3). 5 refs. O.R.E.

[Cf. *For. Abstr.* 15 (No. 3192).] A comparison is made of the Fe-mobilization capacities of (1) laboratory-prepared leaf extracts, (2) natural rain leachates from decomposing leaves and from A horizons of podzol soils, and (3) solutions dripping from the forest canopy during rain. The data show clearly that conclusions on the mobilization of Fe in soil genesis under virgin conditions will require the collection for study of solutions obtained beneath the forest canopy and from materials decomposing under conditions as natural as possible.

1352. HANDLEY, W. R. C. **Mull and mor formation in relation to forest soils.** *Bull. For. Comm., Lond.* No. 23, 1954. pp. iv + 115 + 14 photos. 186 refs. Price 10*s*.

The first part of this bulletin (pp. 1–52) is a survey of previous work on the subject from which the following conclusions are derived: (*a*) The quantity of cellulose in the organic matter of mor is greater than that in mull. (*b*) The N of mor appears to exhibit a greater degree of resistance to mobilization by biological agencies than that of mull. (*c*) There is a tendency for the production of extremely acid conditions when mor is formed. (*d*) The soil fauna populations of mull and mor seem to exhibit characteristic differences. (*e*) The differences between mull and mor appear to be due to differences in type and course of decomposition and re-synthesis rather than different rates of decomposition of litter. (*f*) Any particular condition represents a phase in a dynamic system that is reversible under the influence of the changing intensity of various factors.

Part II describes and discusses the author's investigations based on the above-mentioned characteristics. Recognizable fragments of litter from increasing depth in mor formed from the litter of *Calluna vulgaris* were embedded in wax. Serial sections of this material indicated that vascular tissue disappears first, leaving a residue of leaf mesophyll tissue which ultimately becomes an amorphous mass containing mesophyll cell walls apparently coated with some protective material. Similar results were obtained for material from samples of mor formed from e.g. Beech, Norway Spruce, or *Abies pinsapo* litter. Similar examination of mull-forming litter indicated that here the mesophyll tissue disappears first, leaving the more resistant vascular tissues. From serial sections of shoots of *Calluna vulgaris* having both dead and living leaves, changes have been observed in the mesophyll tissue, when the leaf dies whilst still on the living plant, which give the mesophyll tissue the appearance it retains until it becomes amorphous material in the mor. This change, occurring while the leaf is still on the tree, would appear not to be due to a product of microbial metabolism. The material which appears as a result of changes in the mesophyll tissue when the leaf dies, would seem to be that which protects the cellulose walls of the mesophyll from decomposition when the litter falls on to the surface of the mor. Experimental evidence is put forward to show that the essential part of the change occurring when the leaf dies is a precipitation or stabilization of cytoplasmic protein by a process which can be likened to that occurring when hide is tanned. Active protein-precipitation agents have been found in aqueous extracts of the fresh leaves of a number of plant species, including some commonly associated with the formation of mull. The similarity of these protein-precipitating materials in extracts of fresh leaves to vegetable tannins is indicated, and it has been shown that, like vegetable tannins, they are readily rendered inactive by micro-organisms when they are not united to protein, whereas the complexes formed with protein are resistant to breakdown. It is concluded that leaf proteins stabilized by protein-precipitating materials on the death of the leaf are an important factor in the processes leading to mor formation. It is suggested that these stabilized proteins are, in certain species (those whose litter gives rise to mor), so resistant to decomposition under some conditions that much of the mesophyll tissues of the litter comes to lie as a layer of organic material on the surface of the soil. Although similar materials may be formed in the mesophyll tissue of dying leaves of species whose litter gives rise to mull, they are probably much less resistant to decomposition; with the most important consequence for biological processes, that whereas available N is very scarce in mor it is more plentiful in mull. There are indications that the presence of constituents from the litter of some mull-forming species aids the breakdown of the resistant nitrogenous material derived from the mor-forming species, thereby accounting for the reversibility of the mull ⇌ mor system. *From author's summary.*

1353. JOHNSTON, D. R. **Afforestation of base-deficient soils.** *Quart. J. For.* 48 (4), 1954 (285–92). 18 refs.

The mechanism of podzolization is discussed and the raw-humus/podzol and mull-humus/brown-forest-soil relationships compared. The limitations of the podzol profile as a rooting medium are examined and it is suggested that, in the majority of cases, the existence of a podzol profile to-day can be traced to man's interference with the natural vegetation by burning, grazing, or planting. The evolution of ideas on raw-humus formation is briefly reviewed and the conclusion is reached that the formation of mull or mor from tree litter is dependent not upon the rate of breakdown, but rather upon the biological type of decomposition. The tendency of conifers to form raw humus and of hardwoods to form mull humus is discussed in relation to the conflicting needs in Great Britain to produce large quantities of softwood timber and, at the same time, to maintain the fertility of the poorer forest soils. Continental techniques are discussed and it is suggested that, in addition to fundamental research, sample plots should be laid out on a

relatively large scale to investigate the effects of hardwood/conifer mixtures upon base-deficient soils. In addition, economic uses will need to be found for the less exacting hardwood species. *From author's summary.*

114.4. Soil Classification. Soil Types

See also Nos. 1352–3, 1362, 1504–5, 1573, 1698–1703.

1354. MOHR, E. C. J., and BAREN, F. A. VAN. **Tropical soils: a critical study of soil genesis as related to climate, rock and vegetation.** N. V. Uitgeverij W. van Hoeve, The Hague and Bandung. 1954. pp. 498. Many refs. [E.] Price 61*s*.

Contains the following chapters (each with a list of references): (1) Fundamental considerations of atmospheric climate and soil climate; (2) Rocks and rock minerals; (3) Climate versus rock in tropical soil formation; (4) Rock weathering (a review of katamorphism in British Guiana, Cuba, Puerto Rico, French Guinea, Madagascar, Malabar Coast, Sumatra, Java, New Guinea, the Caroline Is., and Hawaii); (5) Clay mineral formation in tropical soils; (6) Mineral associations in soils; (7) Granulometric analysis in relation to the diagnosis of tropical soils; (8) Factors governing the formation and decomposition of organic matter; (9) Genetic conceptions of tropical soil formation; (10) The genetic conception applied to Indonesian soils; (11) Some other aspects of tropical soil formation; (12) Lateritic soils; (13) Podzolic soils; (14) Margalitic soils; (15) Other important soil types; (16) Classification of tropical soils.

1355. NĚMEC, A. Typy lesních půd. **[Forest soil types.]** *Lesn. Knihovna* (*malá Řada*) No. 34, 1954. pp. 284. 6 pp. of refs. [Cz.] Price *Kčs* 32·10.

The first 9 chapters (pp. 5–63) deal with general topics, viz. the history of forest soil science, the term 'soil', influence of external factors on soil formation, the chief soil-forming minerals, parent rocks (with special reference to those occurring in Czechoslovakia), weathering and soil formation, pH, humus (classification and chemistry), and genetic soil types. The remainder of the work is devoted to a detailed treatment, with many tables and graphs illustrating the chemical properties of the horizons of the soil profile, of the chief soil types of Czechoslovakia—chernozems, rendzinas, brown forest soils, podzolic soils and podzols, and groundwater soils (gley soils of various types and limonite soils). The accounts of the last two groups include sections on soil improvement, e.g. by cultivation, fertilizing, and choice of species. An index is provided.

1356. PECROT, A., and AVRIL, P. Les sols Ardennais. 1. Étude morphologique et génétique des sols bruns acides et des sols podzoliques du Plateau de Saint-Hubert. **[Soils of the Ardennes. 1. A morphological and genetical study of the acid brown soils and the podzols of the St. Hubert plateau.]** *Bull. Inst. agron. Gembloux* 22 (1/2), 1954 (52–75). 23 refs. [F.f.flem.e.g.] E.M.B.

The acid brown soils are good forest soils carrying 2 different kinds of Beech association (*Festuca sylvatica* and *Luzula nemorosa*) depending on soil depth and physical properties. The podzols are found on steep slopes with a southerly aspect, the subsoil consists of siliceous parent material. They may also be found round peat bogs and along forest margins. They are characterized by an inferior kind of Beech association (*Vaccinium myrtillus*). The podzols do not seem to be deeply degraded and could be regenerated. *From authors' summary.*

1357. KAWADA, H., and TAKAMI, M. **[Studies on the Japanese Cedar forest soils of the Akita district and on black forest soils. (Part 2). The correlation between humus forms and soil types.]** *J. Jap. For. Soc.* 36 (10), 1954 (283–7). 4 refs. [Jap.jap.e.]

1358. **International Peat Symposium under the auspices of Bord na Móna, Dublin, July 1954.** Bord na Móna, Dublin. 1954. [E.] (22 separate papers.)

The following papers have been published and can be obtained separately from Bord na Móna, Dublin: A preliminary investigation on the chemical composition of sphagnum moss and peat (*W. A. P. Black, W. J. Cornhill,* and *F. N. Woodward*); The comprehensive examination of peat (*G. F. Mitchell*); Notes from the survey of Scottish peat deposits (*A. Tomter*); The classification and chemical properties of peat soils in Finland (*E. Kivinen*); Trace elements in Scottish peats (*R. L. Mitchell*); Classification and nomenclature of peat and peat deposits (*G. K. Fraser*); Agricultural exploitation of high bog (*M. J. Costello*); Fertiliser industry based on peat (*Krebs & Co., Paris*); Bog reclamation in Bavaria (*O. Kraemer*); X_2 an organic soil conditioner prepared from peat (*J. Hudig*); Bog reclamation (*W. Baden*); Investigation on the formation of grassland in the Vernier bog (*L. Hédin* and *J. M. Lefebvre*); The agricultural utilisation of Vernier bog (*Y. Ferronnière*); Irish bog ecology: its rôle and development (*J. J. Moore*); Dehydration of peat bogs by drainage (*M. Maguire* and *H. M. S. Miller*); Some considerations affecting the classification of the bogs of Ireland and their peats (*T. A. Barry*); Reclamation of peat soils (*J. Hinricks*); Peat moss in Ireland—some aspects (*T. O'Leary*); Afforestation of peat soils [in Ireland] (*T. McEvoy*); The afforestation of peat in Great Britain (*J. MacDonald*); The afforestation of bog soils [in Germany] (*J. Dittrich*).

114.5. Soil Fertility. Soil Toxicity. Soil Depletion and Exhaustion

See also Nos. 1355–6, 1505–6, 1509, 1561, 1730–4, 1770, 2040, 2042–3.

1359. BECKING, R. W. **Site indicators and forest types of the Douglas Fir region of western Washington and Oregon.** *Abstr. of thesis,* in *Dissert. Abstr.* 14 (8), 1954 (1119–20). [University of Washington.] O.R.S.

Based on data from 325 vegetation plots 20 × 20 m. sq.

1360. NĚMEC, A. Degradace a onemocnění lesních půd. **[Degradation and 'sickness' of forest soils.]** *Lesn. Práce* 33 (8), 1954 (346–51). [Cz.]

Human interference, in particular the introduction of pure coniferous stands, may degrade the soil, e.g. by accelerating podzolization. When the B horizon becomes hard and impermeable, the author regards

the soil as 'sick', i.e. unfit for growing trees (especially the more exacting hardwoods), characterized by stunted growth and, ultimately, by the dying-out of forest trees and failure of regeneration. Besides pure conifer plantations, some pure broadleaved stands (Beech, Oak) can also produce soil degradation. It is estimated that, in Bohemia and Moravia, the area of 'sick' forest soils is 80,000–100,000 ha. Recent investigations [not quoted] show that soil degradation reduces the mean volume c.a.i. of conifers from the normal figure of 3·2 cu.m./ha. for Bohemia (and 4·2 cu.m./ha. for Moravia) to 1·5–2·5 cu.m./ha. for Spruce, and to 0·6–2·0 cu.m./ha. for Pine.

114.6. Soil Biology

See also Nos. 1389, 1504, 1584, 1586, 1653, 1887.

1361. Pochon, J., *et al.* Manuel technique d'analyse microbiologique du sol. **[Technical manual of microbiological soil analysis.]** Masson et Cie., Paris. 1954. pp. viii + 123. [F.] (Monographie de l'Institut Pasteur.) Price [17*s.* 6*d.*]

1362. Ambrož, Z. Výsledky mikrobiologického průzkumu koloběhu uhlíku a dusíku v různých lesních půdách. **[Results of microbiological studies of the C and N cycles in different forest soils.]** *Sborn. čsl. Akad. zeměd.* (*Ser. A*) 27 (5), 1954 (385–400). 29 refs. [Cz.russ.] [Ústav mikrobiologie Vysoké školy zemědělské, Brno.] C.G.B.

Presents the results of microbiological and biochemical studies of (1) a rendzina and (2) a brown forest soil, in each case under Oak and Spruce, near Brno. Though both soils showed higher biological activity under Oak than under Spruce, differences associated with soil type far exceeded those due to tree species, (1) being very much more active than (2). Tables and graphs illustrate, for two depths in the soil (1–3 and 15–20 cm.) and for all four seasons, the populations of bacteria (total), actinomycetes, mould fungi, spore-bearing bacteria, bacteria utilizing NO_3-, NH_3- or organic N, ammonification and nitrification, cellulose decomposition and micro-organisms decomposing lignin, humates and pectin. Maximum populations of bacteria + actinomycetes were found in summer for the top 1–3 cm. and in autumn for the layer 15–20 cm. deep. Both number of species and total numbers of mould fungi were much higher in (2), where *Penicillium* spp. and fungi imperfecti (e.g. *Alternaria, Stemphylium, Helminthosporium, Trichoderma*) were characteristic, than in (1), where the chief fungi were *Penicillium, Mucor, Absidia* and *Zygorrhynchus* spp. The maximum fungus populations occurred in autumn. For the spore-bearing bacteria, maximum populations were found in late summer at the upper and in autumn at the lower level, except under Spruce on (2), where a spring maximum was observed for the upper level. Of this group *B. mesentericus* was dominant in (1) and *B. cereus* in (2), though *B. mesentericus* and *B. idosus* were also frequent in the latter under Spruce. Maximum populations of bacteria utilizing NO_3-N occurred in summer; of those using NH_3- and organic N, in spring and autumn, with a depression in summer. Both ammonification and nitrification were stronger in (1) than in (2). Evidence on the turnover of C gave similar results, the indications being that cellulose decomposition is most intense in autumn, that of lignin and humates also in autumn but with a secondary peak in spring, while that of pectin shows on the whole a gradual rise from spring to autumn. [Cf. *For. Abstr.* 15 (No. 2222).]

1363. Ikeda, S. **[The distribution of fungi in sand-dune soil.]** *J. Jap. For. Soc.* 36 (8), 1954 (221–4). 10 refs. [Jap.jap.e.]

Penicillium and *Aspergillus* were the commonest fungi, and were found in all 3 months (April–June) in which samples were taken. *Penicillium* was found on all, and *Aspergillus* on 8, of the 10 sites sampled. *Mucor* was abundant in fertile, fairly moist plantation soils (with *Pinus thunbergii* and *Robinia pseudoacacia*) and present in small amounts in barren soil near the shore line. *Fusarium* was found in June and was abundant in plantation soils (with e.g. *R. pseudoacacia*) and present infrequently in soils with *Carex macrocephala*. *Epicoccum* was found very rarely in plantation soils (*Populus*) in April, and *Zygorhynchus* occasionally in June on the site furthest from the shore line. *Cladosporium, Rhizops* and *Alternaria* were very rare. [Results are given in tables with some English legends.] *From author's summary.*

1364. **Soil fauna.** *Rep. Nat. Conservancy, Lond. 1953/54*, 1954. (10–1).

Reconnaissance of a large number of woods showed that the best approach to a study of the soil and litter fauna of typical northern woodlands could be made by simplifying the problem, and making rapid, qualitative samplings, on a standard procedure, in a number of pure stands of different species. Organization to a close time-table, and careful preparation in the laboratory, made it possible to take fauna samples from 36 different sites in 4½ weeks in Nov.–Dec. 1953.

1365. **[Population analyses on soil and litter fauna in forests.]** *Meded. Inst. toegep. biol. Onderz. Nat.* No. 16, 1953 (16–8). [Du.]

Different methods of sampling used were the ordinary box trap method, the funnel method in which the funnel leads down into a container of ethylene glycol, and the plank method in which planks 15 × 30 cm. are placed on the soil at intervals and an examination is made of the soil fauna congregating underneath; this last method is effective for determining population density of some species only.

1366. **[The breakdown of organic material in the soil.]** *Meded. Inst. toegep. biol. Onderz. Nat.* No. 16, 1954 (10–3). [Du.]

Results of quantitative analyses of soil fauna in Oak coppice in the Veluwe are discussed briefly and compared with those for Oak, Birch, Beech and Larch stands in the same area; the whole area was found to be rich in species but poor in individuals. A study on the litter layer from autumn 1952 to Nov. 1953 showed that the litter was increased through falling leaves by 75% between Nov. and March but that it had been reduced to its previous

level, as a result of activity by fungi and micro-arthropods, by the following September. Some figures are given for the quantities of different micro-arthropods present in various months and for their consumption of leaves and mycelia. Fungus activity was considerable only from June onwards; between June and Sept. about 5% of the protein and 70% of the cellulose were decomposed by fungi.

1367. MURPHY, P. W. **Soil faunal investigations.** *Rep. For. Res. For. Comm., Lond. 1952/53*, 1954 (110–6). 8 refs.

[Cf. *For. Abstr.* 15 (Nos. 34, 1051).] No fewer than 53 species of Acarina have been extracted from heathland soils and are listed, including 2 new species, 2 new British records of genera, and 5 new specific records. The distribution of the mites in relation to pore space and soil moisture is discussed, and the conclusion reached that water content and possibly lack of oxygen are effective barriers limiting the fauna to a narrow surface and subsurface zone of the raw humus. High populations of particular species are found in the humus 'sandwich' resulting from ploughing. Experiments are in progress to ascertain the preferences of the more important species for different types of litter, and to try to get some quantitative estimate of the amounts of litter consumed.

1368. GUNHOLD, P. Vergleichende bodenzoologische Untersuchungen an Wald-, Wiesen- und Ackerböden im pannonischen Klimagebiet. **[Comparative soil-fauna investigations in forest, meadow and arable soils in the Pannonian climatic region [of Austria].]** *Z. PflErnähr. Düng.* 66 (1), 1954 (19–29). 13 refs. [G.g.] O.R.S.

A study of the seasonal variation of soil-fauna populations.

1369. VARGA, L. Adatok az erdötalajok protozoonjainak földrajzi elterjedéséhez. **[Data on the geographical distribution of protozoa in forest soils.]** *Annales Instituti Biologici (Tihany) Hungaricae Academiae Scientiarum, Tihany* 1953 (145–51). [Hu.?] From *abstr.* in *Hung. agric. Rev.* 3 (2), 1954 (17). [E.] C.G.B.

Direct and dilution methods were used to identify soil protozoa in 12 samples of forest soil (Java, Italy, Hungary, Finland): 81 types [species?] of protozoa were identified, the tropical forest soil (Java) being particularly rich in types [species?] (with a very high number of Testacea). Soils under coniferous forests in Italy and Hungary were richer in protozoa than those under broadleaved forests.

116. *Hydrology. Soil and Water Conservation and Erosion*

See also Nos. 1343, 1586, 1610, 1703–8, 1755, 1760, 2571–2.

1370. KHAN, M. I.-U.-R. **Water and soil problems in arid regions.** *Pakistan J. For.* 4 (2), 1954 (65–77). 33 refs.

A survey of world literature, with a discussion of conditions in W. Pakistan.

1371. ONODERA, S. **[The influence of windbreaks and forests on snow deposition.]** *J. Jap. For. Soc.* 36 (10), 1954 (300–7). [Jap.e.]

Meters were set up round obstacles such as gate posts and windbreaks with thick or thin branches, on the meteorological experimental field and in the forest. Results include the following: (1) A deep snow hollow formed to leeward of the gate and stretched to a distance of 3–4 times the post's height. (2) A gentle slope formed to windward of the windbreak with thick branches, and snow was deposited on the leeward to a distance of twice the tree height. (3) Snow was not deposited to any extent to leeward of the windbreak with thin branches. (4) The depth of snow in the forest was 20–30% less than that in the open. (5) Snow melting near the windbreak was more than 3 days, and in the forest 10–15 days, later than in the open. Delay in snow melting appears to be related to tree species and crown density in the forest. *From author's summary.*

1372. ZELENÝ, V. Výzkum sněhové pokrývky v lese. **[Investigation of the snow cover in forests.]** *Sborn. čsl. Akad. zeměd.* 27*B* (4), 1954 (475–84). 8 refs. [Cz.cz.russ.] C.G.B.

Snow density was determined by taking samples with a tube 100 cm. long, 9·54 cm. diam. and volume 71·44 c.c. ($= \frac{1}{7}$ of the capacity of the normal rain-gauge, 500 c.c.) and melting them. Measurements carried out in the Beskid Mts. showed that: (1) the depth of snow cover is, as a rule, less in pure coniferous, than in mixed or broadleaved stands; (2) the apparent snow density is also greater in mixed and broadleaved stands; (3) the maximum water value (depth of water equivalent to the snow cover) is not sufficient for silviculture and agriculture if the snow density is low, because such snow thaws too rapidly. A formula for the 'hydrological effectiveness' of snow has been suggested, viz $H = \sqrt{h^1 \times s}$, where h^1 is the water value and s the snow density. The observed densities varied between 0·163 and 0·378 g./c.c.

1373. MAŘAN, B., and LHOTA, O. Povrchový odtok v lese a v bezlesi. **[Surface run-off in forests and in unforested areas.]** *Sborn. čsl. Akad. zeměd.* 27*B* (4), 1954 (349–78). 73 refs. [Cz.cz.russ.] C.G.B.

Presents tabulated results of measurements made in the Beskid Mts. and near Prague in 1952–53 on 13 different site types. The test plots each 10 × 5 m., were exposed to artificial rain from a special portable plant of local design (described). Run-off from the surface and first 5–10 cm. of soil was led by means of a sheet-iron trough to a measuring vessel. Little run-off (only 0·007–0·05 cu.m./sec./sq. km.) occurred in young Beech or Spruce/Silver Fir stands, even at intensities of 101–123·2 mm./hour. From stone and boulder screes, the run-off was small (0·12–0·45 cu.m./sec./sq. km.) irrespective of slope and stand composition. The least run-off was observed for a mixed stand (6 Beech/2–3 Fir/1–2 Spruce) having sufficient neutral humus, at 0·43–0·64 cu.m./sec./ sq. km. for a rainfall of 39·1–97·2 mm./hour; in pure Spruce stands the run-off was 2·5–3 times as great. Low forest densities and poor grass or weed cover proved very unfavourable: at a density of 0·5–0·8 (with 33% of the area under grass) the run-off was 2·5 times, and at a density of 0·2–0·5 (with weeds

everywhere) 4–7 times as great as for density 1·0. A destructive run-off of 5·89 cu.m./sec./sq. km. was measured on an old felling site covered with grass. It was found that a very thick layer of undecomposed Beech leaves was rather detrimental: the run-off in this case was from 2·66 to 11·77 cu.m./sec./sq. km. (the peak value recorded in these experiments for forest soils). The run-off from pasture land was several times as great as that from forest stands. Given the same stand and a sufficient proportion of mild humus, the run-off increased with increase of slope in a degree exceeding the mere effect of slope increase. In stands of normal density (particularly mixed stands), the incident water is absorbed even during heavy downpours; the figure for soil transported was 1·5 kg./ha./hour in a Beech/Fir/Spruce stand, 7·82 kg./ha. in a Spruce stand, and no less than 29,670 kg./ha. for a pasture, under 88·0 mm./hour rain in the case of stands, and 94·8 mm./hour for the pasture. The slope in all 3 cases was ca. 43%. The bibliography is world-wide.

1374. PASÁK, V., and ZELENÝ, V. Výsledky měření průtoků v beskydských bystřinách v suchém období roku 1952 pří výzkumu vlivu lesa na nízké vodní stavy. **[Results of stream-discharge measurements in the Beskid range in the dry season of 1952, during the investigation on the effect of forests on the low water level.]** *Práce výzkum. Úst. lesn. ČSR* No. 4, 1954 (35–52 + 1 tbl.). 29 refs. [Cz.cz.russ.e.]

Late in July, 1952 (in this year the rainfall was nearly average for the locality), a series of measurements were made of the discharge of 33 catchments in the Beskid range, in order to study the determining factors. The effects of area, altitude, and topography of the catchment, depth to bedrock and soil type, were determined. The presence of forests in the catchment was found to raise the water table during drought. Thus during the 1952 drought period, the relative mean discharge (in litres/sec./sq. km.) for areas with 100, 90–99, 80–89 and 60–69% forest cover was 100, 73, 60, 23%, respectively. Mixed stands, having both deep and shallow roots, contribute to a favourable water balance in the soil. Artificial regeneration of felling sites brings about a less favourable water balance than natural regeneration.

1375. GABBRIELLI, A. Ricerche sull' erosione a Vallombrosa. **[Research on erosion at Vallombrosa.]** *Ital. for. mont.* 9 (5), 1954 (265–7 + 1 plate). 9 refs. [It.it.f.]

Notes on the lay-out of sample plots under (1) Silver Fir, (2) Beech, (3) grass, and (4) on bare ground.

1376. SOLJANIK, I. O biološkim merama borbe protiv erozije u Trgoviškim Timoku. **[Biological erosion control measures in the [catchment of the] Trgoviški Timok [Serbia].]** *Šumarstvo* 7 (7/8), 1954 (396–419). 84 refs. [Serb.f.g.]

Data from literature (mostly Jugoslav) and from the author's own investigations in different parts of this catchment show that, besides afforestation, a very effective measure for controlling erosion is the introduction of grass cover. The period of natural formation of a sufficient grass cover depends primarily on aspect; it is 5–7 years on S., and 3–5 years on N. slopes. The author recommends putting at least 30% of the eroded areas under grass.

1377. FILIN, V. I. Borjba s zanosami rusel rek produktami ploskostnoĭ i lineĭnoĭ èrosii. **[Control of river-bed silting by the products of sheet and gulley erosion.]** *Lesn. Hoz.* 5 (4), 1952 (22–4). [Russ.]

Recommends various Osier Willows and *Populus alba* for erosion-control plantations, on the basis of experience in the ravines along the R. Desna between Bryansk and Trubchevsk. Contrary to text-book advice, planting of actual ravine bottoms is advised to promote the deposition of erosion products there.

1378. GORČAKOVSKIĬ, P. L. Vodoohrannoe i počvozaščitnoe značenie vysokogornyh lesov Urala. **[The importance of the high-montane forests of the Urals in soil and water conservation.]** *Lesn. Hoz.* 5 (4), 1952 (18–21). [Russ.]

The rôle of the Kama as the main tributary of the Volga has become specially important with the building of the Kuibyshev and Stalingrad hydroelectric plants. Most of its catchment (which itself represents ⅛ of the total catchment of the Volga) lies in the forests of the Urals, which should therefore be managed for water conservation, and their working limited to improvement fellings and the removal of dead and diseased trees. Areas where forest fires and uncontrolled felling have led to lowering of the timberline should be reforested, the most suitable species being *Betula tortuosa*, *Larix sukaczewii* and *Pinus pumila*.

1379. GORRIE, R. M. **The Damodar Valley Corporation's forestry task.** *Emp. For. Rev.* 33 (3), 1954 (228–33 + 2 plates).

A comparison between the Tennessee Valley Authority and its Indian counterpart, the Damodar Valley Corporation, shows that the experience gained in the oldest American 'valley project' is of great value to those attempting similar projects elsewhere. A serious initial handicap for the D.V.C. is shown to be its legislative act, which encourages interference from local political forces when a clear and firm board management undisturbed by political issues is the essential need. Details are given of a 15-year programme which has been drafted for afforestation of down-at-heel forest, reclamation of eroding waste, and recruiting and training of a soil conservation extension service to help the peasants to stop erosion in farm lands. *Author's summary.*

1380. GLOVER, SIR H. M. **Soil conservation in parts of Africa and the Middle East. Part II (cont.). Jordan. Lebanon.** *Emp. For. Rev.* 33 (3–4), 1954 (239–43 + 8 photos; 335–7 + 8 photos).

Cf. *For. Abstr.* 15 (No. 3208).

1381. TAMAYO, F. Venezuela triunfa sobre el desierto. **[Venezuela triumphs over the desert.]** *Mensajero for., Durango* No. 119, 1954 (18–20). [Span.]

A short account of the conservation work in progress at Tacagua, where a small experiment station has been set up.

14. SYSTEMATIC ZOOLOGY

145.7. Insecta. Entomology

See also Nos. 1944 *et seq.*, 2383 *et seq.*

1382. BALACHOWSKY, A. S. Sur les *Kermes* Boitard (Hem. Coccoidea) des chênes du bassin oriental de la Méditerranée. [***Kermes* of Oaks in the eastern basin of the Mediterranean.**] *Rev. Path. vég.* 32 (3), 1953 (181–9). 8 refs. [F.] I.M.I.

Describes, with illustrations, the larvae of *K. echinatus*, *K. spatulatus* and *K. palestiniensis* found on Oaks (*Q. coccifera* and *Q. ithaburensis*) in Israel. [Cf. *For. Abstr.* 13 (No. 917).]

1383. HARVEY, G. T. **Absence of diapause in rearings of the Spruce budworm.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (4), 1954 (1).

The rate of rearing of this non-diapause stock, now in its 5th generation, is of considerable interest. The mean per generation is 2 months compared with 6 months in ordinary laboratory rearings and 12 months in nature.

1384. ROONWAL, M. L. **Structure of egg-masses and their hairs in some species of *Lymantria* [*L. mathura, L. obfuscata,* and *L. dispar*] of importance to forestry (Insecta: Lepidoptera: Lymantriidae).** *Indian For.* 80 (9), 1954 (553–9 + 6 plates). 15 refs.

1385. PAULIAN, R. Les '*Scaphidiolum*' Achard d'Afrique Noire (Col. Scaphidiidae). [**The *Scaphidiolum* spp. of French Equatorial and West Africa.**] [*Proceedings*] 2ª *Conferência Internacional dos Africanistas Ocidentais 1947, Lisbon* Vol. 3, 1951 (193–200). [F.]

1386. PAULIAN, R. Les Histérides (Col.) de la réserve forestière du Banco. (Côte d'Ivoire). [**The Histeridae of the Banco forest reserve (Ivory Coast).**] [*Proceedings*] 2ª *Conferência Internacional dos Africanistas Ocidentais 1947, Lisbon* Vol. 3, 1951 (185–91).

1387. SCHEDL, K. E. **Scolytoidea from the Gold Coast. I. (135. Contribution to the morphology and taxonomy of the Scolytoidea.)** *Rev. Zool. Bot. afr.* 50 (1/2), 1954 (45–88). 17 refs. [E.]

Comprises (1) a checklist of Gold Coast Scolytoidea from the literature, (2) a checklist of species collected by G. H. Thompson, (3) a list of host plants, (4) description of new species, and (5) a short bibliography.

1388. GYRISCO, G. G., WHITCOMB, W. H., BURRAGE, R. H., LOGOTHETIS, C., and SCHWARDT, H. H. **Biology of the European chafer *Amphimallon majalis*, Razoumowsky (Scarabaeidae).** *Mem. Cornell agric. Exp. Sta.* No. 328, 1954. pp. 35. 44 refs.

1389. BRAUNS, A. Terricole Dipterenlarven: eine Einführung in die Kenntnis und Ökologie der häufigsten bodenlebenden Zweiflüglerlarven der Waldbiozönose auf systematischer Grundlage. [**Terricolous larvae of the Diptera: an introduction to the recognition and ecology of the most frequent soil-inhabiting fly larvae of the forest biocoenosis, on a systematic basis.**] 'Musterschmidt,' Wissenschaftlicher Verlag, Göttingen. 1954. pp. 179 + 6 plates + 96 illustrations with accompanying text. 10 pp. of refs. [G.] Price *DM*19·80.

This lavishly illustrated work is based largely on the author's own studies of dipterous larvae as members of the soil fauna (including species found in rotting stumps etc.) in various types of forests in Germany, supplemented by other German material and limited material received from Austria and Spain. It is in 3 parts: (1) A key to families, followed by condensed information on diagnostic characters, ecology and significance in soil biology, arranged under families, with keys to genera and species (pp. 15–125). (2) A summary of the author's own work and of literature on soil-biological aspects, under the heads: area studied; soil profile and methods of study; occurrence of the terricolous habit by families; soil as a habitat, and adaptations of the larvae to life in the soil; seasons of activity; population densities; position of dipterous larvae in the biocoenosis; and their significance in soil biology (pp. 126–42). (3) An introduction to the morphology of dipterous larvae with emphasis on characters of taxonomic importance, followed by general notes on the systematic classification of the Diptera into major groups (pp. 143–59). There is a 9-page subject index. The illustrations are mostly designed to show the diagnostic characters of the larvae, but include some drawings and photos of feeding patterns, habitats, and excrement, a table of seasonal activity, and a diagram indicating habitat and mode of nutrition of the families dealt with.

1390. TRIPP, H. A. **The instars of a maggot (*Pegohylemyia*) inhabiting White Spruce cones.** *Repr.* from *Canad. Ent.* 86 (4), 1954 (185–9).

This species has only 2 free-living larval instars; the first-instar larvae develop within the egg chorion.

15. ANIMAL ECOLOGY. GAME AND FISH MANAGEMENT, HUNTING, SHOOTING AND FISHING

See also Nos. 1540, 1937 *et seq.*

1391. KLUYVER, H. N., and TINBERGEN, L. **Territory and the regulation of density in titmice.** *Repr.* from *Archives Néerlandaises de Zoologie, Leiden* 10 (3), 1953 (265–89). 17 refs. [E.e.]

Great tits have an aversion for localities that bear a dense population of the same species. They seem to prefer mixed woods to Pine woods, but as the mixed woods become more densely populated, excess birds settle in the Pine woods. Thus the attractiveness of the mixed wood *per se* is counterbalanced by the repelling influence of the population already present.

1392. SHORTEN, M. **Squirrels.** *New Naturalist*, Collins, London. 1954. pp. xii + 212 + 15 plates. 102 refs. Price 15*s.*

General characteristics, history in Britain, distribution, activity, and breeding of red and grey squirrels; squirrels and trees; the relationship between red and grey squirrels; and control.

1393. THOMPSON, G. H. **Animal populations and forestry.** *Nature, Lond.* 174 (4435), 1954 (813–5).

Summarizes a symposium held at Oxford during the British Association meeting, when papers were

read on: forms of injury caused by animals at different stages in the life of a forest (*G. H. Thompson*); methods of estimating grey squirrel populations (*F. A. Courtier*); population studies on the wood mouse (*Apodemus sylvaticus*) and the bank vole (*Clethrionomys glareolus*) (*H. N. Southern*); and the status of the Pine looper (*Bupalus piniarius*) in Britain (*M. Crooke*).

1394. Turček, F. J. Ekologická analýza populácie hraboša lesného (*Clethrionomys glareolus*) na Pol'ane v roku 1952. **[Ecological analysis of a population of *C. glareolus* on Mt. Pol'ana [Slovakia] in 1952.]** *Práce výzkum. Úst. lesn. ČSR* No. 3, 1953 (325–74). 34 refs. [Slovak.russ.e.]

1395. Carne, P. H. **Roe deer, fallow and sika.** *Oryx* 2 (6), 1954 (388–91).

Discusses the position of roedeer in Dorset, Epping Forest, Sussex, the New Forest and Wiltshire and concludes that this species, plentiful all over Britain up to Saxon times, is powerfully deterred from increase for some unexplained reason by the presence of fallow or sika deer. After the Norman Conquest fallow deer were second only to the red deer as a beast of royal venery and became abundant and widespread.

1396. Foster-Vesey-Fitzgerald, D. **Wild life in Tanganyika.** *Oryx* 2 (6), 1954 (357–65 + 1 photo).

Quotes numbers of game per square mile by species for the *Brachystegia*-forest/valley-grassland catena.

16. GENERAL BOTANY

160. *Plant Chemistry*

See also Nos. 1351–2, 1404–5, 1506, 1533, 1656, 1754, 1950, 2188 *et seq.*, 2484 *et seq.*

1397. Ščerbakov, A. P. Novye dannye o nakoplenii èlementov zoly i azota različnymi tkanjami dvuhletok hvoïnyh porod. **[New data on the accumulation of ash elements and N by different tissues of 2-year conifer seedlings.]** *Dokl. Akad. Nauk SSSR* 95 (6), 1954 (1343–6). 13 refs. [Russ.] [Institut Lesa Akademii Nauk SSSR.] A.P.B.

Presents data from a study of the composition of needles, stem and roots—each analysed in 3 fractions representing the youngest, intermediate and oldest parts of the organ concerned—of 2-year Norway Spruce, Scots Pine and Larch grown on a medium-podzolic clay-loam in Moscow province and sampled for analysis monthly from March to Nov., 1948. The total ash, CaO and MgO contents are tabulated in full, and some other results discussed without giving actual data. In needles, the ash, CaO and MgO contents generally increased from the youngest to the oldest, though MgO in Pine and to a lesser extent in Larch sometimes showed a maximum in needles of medium age. K, N and P decreased regularly with increasing age of needles. In stems and roots the ash elements and N decreased regularly from the youngest to the oldest parts in all species except Larch, in which the ash, CaO and MgO contents of the stem were highest in parts of medium age, especially during July–August. The periodic fluctuations that occurred in the mineral and N contents during the season of observation could not always be related to external factors such as temperature and moisture. A point of special interest was the simultaneous accumulation of Ca and Mg, with no evidence of antagonism between the two. [Cf. *For. Abstr.* 13 (No. 3606).]

1398. Puri, G. S. **The foliar constituents in some tree species of *Shorea robusta* forests of the Siwaliks, U.P., India.** *Indian For.* 80 (11), 1954 (700–6). 32 refs.

Tabulates ash, Ca, C, and N content and C/N ratio for leaves of 78 species, and discusses the ecological and silvicultural implications. [Cf. *For. Abstr.* 12 (No. 2838).]

1399. Webb, L. J. **Aluminium accumulation in the Australian-New Guinea flora.** *Aust. J. Bot.* 2 (2), 1954 (176–96 + 1 plate). 35 refs. O.B.D.

Of 1324 species tested, 80 proved to be Al-accumulators. The significance of Al accumulation is discussed from the point of view of biochemistry and anatomy, ecology and taxonomy. The recorded accumulators are mainly restricted to what are usually considered the more primitive groups in the dicotyledons and Filicales. Obligate accumulators are confined to leached acid soils from a variety of parent materials, in comparatively high-rainfall areas. There is evidence that accumulation is an adjunct of specialization, chiefly among tree species able to exploit impoverished soils in relatively primitive, generally tropical, mesic habitats. The re-deposition of Al beneath Australian rain-forest communities dominated by accumulators (e.g. *Ceratopetalum apetalum*) may be an important ecological and pedogenic factor. Al-accumulation may be a useful special character in the clarification of some taxonomic problems. *From author's summary.*

1400. Vinogradova, H. G. Soderžanie molibdena v rastenijah v svjazi s ih sistematičeskim položeniem. **[The molybdenum content of plants in connexion with their systematic position.]** *Dokl. Akad. Nauk SSSR* 93 (1), 1953 (163–6). 5 refs. [Russ.] A.P.B.

Tabulates the Mo contents (in % based on dry weight) of seed from 25 spp. of Leguminosae grown in Crimea. The mean for 19 spp. of Papilionatae was 5×10^{-4}%, and for 5 spp. of Caesalpinioideae, $7{\cdot}5 \times 10^{-5}$%. Seed of *Albizzia julibrissin*, the only sp. of the Mimosoideae tested, showed 1×10^{-3}%Mo. Sophoreae, intermediate morphologically between the first 2 subfamilies, was also intermediate in Mo content ($2–3 \times 10^{-4}$%). It is noted that Mo catalyses N fixation by the root-nodule bacteria and also appears to be concerned in the reduction of nitrates in the plant.

161. *Physiology*

See also Nos. 1397–1400, 1499 *et seq.*, 1656, 1676, 1918–9, 2377–80.

1401. Thomas, W. D. E. **Applications of the radioactive tracer technique to problems in plant nutrition and crop protection. Summary of experiments during the period 1948–53.** *Rep. agric. hort. Res. Sta. Univ. Bristol 1953*, 1954 (102–8). 16 refs.

Summarizes work on plant nutrition and systemic insecticides carried out at Long Ashton with the aid of radioactive isotopes. Most of the work was done with ^{32}P, but preliminary tests also with ^{59}Fe, the 47-day isotope of iron.

1402. PISEK, A., and TRANQUILLINI, W. Assimilation und Kohlenstoffhaushalt in der Krone von Fichten- (*Picea excelsa* Link) und Rotbuchenbäumen (*Fagus silvatica* L.). **[Assimilation and C economy in the crown of *P. abies* and *F. sylvatica*.]** *Flora, Jena* 141 (2), 1954 (237–70). 33 refs. [G.g.] O.B.D.

In summer, crown parts in direct sunlight attain their maximum net assimilation at light intensities of ca. 20,000 lux. Direct sunlight (except when the sun is low) is thus never fully utilized. Under intense illumination leaf temperature, respiration and transpiration increase and a water deficit arises in the tree which affects the movements of the stomata and thereby disturbs the C economy. Under particularly unfavourable light and temperature conditions, up to half the gross amount of C assimilated can be lost through respiration. Most favourable for net C assimilation is diffuse light from an overcast sky, and intermittent, moderate periods of direct sunlight. The effects of full exposure to light should be taken into account when regenerating clear-felled areas, particularly on S. aspects and in a dry climate. Shade leaves utilize light to the full. On the shaded side of the crown net assimilation (at least in the outer periphery of the crown) can rise very high. On the sun side this high assimilation capacity can extend deep into the crown, particularly when the sun is low. The favourable C economy of the shaded part of the crown is partly due to the fact that the light intensity necessary to preserve a balanced C economy follows a descending scale from sun leaves to shade leaves. The superior assimilation capacity of the shade leaves is most easily seen when assimilation is calculated on a dry-weight basis. As a result of the relatively higher chlorophyll content of the shade leaves, they also surpass sun leaves on a basis of equal surface area. Under favourable moisture conditions, stomata open less widely at the top of the crown than at the base, and the top for this reason has a smaller C surplus than the base. In unfavourable moisture conditions the opposite occurs. With the first autumn frosts assimilation in Beech falls sharply, whereas in Spruce it continues into the winter. Gross assimilation falls as the year advances, respiration decreasing with the onset of low temperatures. As temperatures fall lower and lower below zero, assimilation ceases earlier than respiration, and continuing low temperatures disturb the C economy.

1403. MICHAEL, K. Untersuchungen über die photosynthetische Leistung gelbblättriger Gehölze. **[Photosynthesis in *aurea* forms of tree species.]** *Flora, Jena* 141 (3), 1954 (389–431). 33 refs. [G.g.] O.B.D.

1404. SÖDERBERG, E. Om cellinnehållet i gymnospermernas och chlamydospermernas endosperm. **[The cell contents of the endosperm of gymnosperms and chlamydosperms.]** *Svensk bot. Tidskr.* 48 (2), 1954 (500–1). 13 refs. [Sw.] O.B.D.

Tabulates data from literature, with authorities, showing the presence or absence of starch, aleurone and oil in some 50 coniferous species, *Ephedra* spp., *Welwitschia mirabilis*, and *Gnetum* spp.

1405. ENGELBRECHT, L. Über Allantoinsäure und Allantoin. III. Ihre Rolle bei der Keimung des Ahorns. **[Allantoic acid and allantoin. III. Their rôle in the germination of *Acer platanoides*.]** *Flora, Jena* 141 (3), 1954 (501–22). 11 refs. [G.g.] O.B.D.

1406. WOLL, E. Untersuchungen über die cytologische Differenzierung einiger Pflanzengallen. **[Cell division in some plant galls.]** *Planta* 43 (6), 1954 (477–94). 19 refs. [G.g.] O.B.D.

Includes results of a study of leaf-galls on *Acer pseudoplatanus* caused by *Eriophyes macrorrhynchus typicus*, *E. macrochelus* and *Pediaspis aceris*.

163. *Embryology*

1407. BOYLE, P., and DOYLE, J. **Development in *Podocarpus nivalis* in relation to other Podocarps. II. Embryogeny in *Eupodocarpus*.** *Sci. Proc. Roy. Dublin Soc.* (*n.s.*) 26 (17), 1954 (289–312 + 35 drawings). 12 refs. Price 17*s*. O.R.S.

Embryogeny from fertilization is described for *P. nivalis* [cf. *For. Abstr.* 15 (No. 1088)]. A critical survey of all available data in Eupodocarp embryogeny shows that the sequence of development of *P. nivalis* is typical of the section. *From authors' summary.*

1408. DOYLE, J. **Development in *Podocarpus nivalis* in relation to other Podocarps. III. General conclusions.** *Sci. Proc. Roy. Dublin Soc.* (*n.s.*) 26 (21), 1954 (347–77). 29 refs. Price 7*s*. O.R.S.

The post-fertilization embryogeny shown to be typical of *Eupodocarpus* [see preceding abstract] is compared with data for the rest of the Podocarpaceae. The greatly varying embryogenies in the family show an underlying common plan and are all readily derived from a basal type without cleavage. A provisional outline of evolutionary development within the family of gametophytes and embryos is given. Analysis of the data suggests that the great range of variation can be accounted for by about a dozen evolutionary tendencies. The distribution and occurrence of the primitive features and advanced tendencies are summarized in a table. *From author's summary.*

1409. HÅKANSSON, A. **Endosperm formation in *Salix*.** *Bot. Notiser* 1954 (3), (326–32). 7 refs. [E.] O.B.D.

Discusses the formation and development of the endosperm and its taxonomic significance.

164. *Morphology*

See also Nos. 1432, 1436, 1462, 1499, 2142.

1410. SACHER, J. A. **Structure and seasonal activity of the shoot apices of *Pinus lambertiana* and *Pinus ponderosa*.** *Amer. J. Bot.* 41 (9), 1954 (749–59). 44 refs. O.B.D.

1411. GIFFORD, E. M. **The shoot apex in angiosperms.** *Bot. Rev.* 20 (8), 1954 (477–529). 6 pp. of refs.

A critical review.

1412. PRAY, T. R. **Foliar venation of angiosperms. I. Mature venation of *Liriodendron* [*tulipifera*].** *Amer. J. Bot.* 41 (8), 1954 (663–70). 23 refs. O.B.D.

1413. HALL, B. A. **Variability in the floral anatomy of *Acer negundo*.** *Amer. J. Bot.* 41 (6), 1954 (529–32). 5 refs. O.B.D.

Describes some interesting variations in the pistillate flowers.

1414. NAGARAJ, M. **Contributions to the floral morphology of *Terminalia chebula* Retz.** *Curr. Sci.* 23 (9), 1954 (299–300). 1 ref. A.P.B.

1415. PRYOR, L. D. **The inheritance of inflorescence characters in *Eucalyptus*.** *Proc. Linn. Soc. N.S.W.* 79 (3/4), 1954 (79–89). 8 refs. D.S.I.R.

The inflorescence of *Eucalyptus* is considered to be a dichasium contracted to give the outward appearance of an umbel. Inflorescences of either 3 or 7 flowers are very common in the genus. The 7-flowered unit is found to be partially dominant to the 3-flowered cluster. Irregular combinations between 3 and 7 flowers sometimes occur in the F_1 and often in segregates in later generations. *Author's summary.*

1416. JAEGER, P., and GIOVANNETTI, M. Le *Zizyphus jujuba* Lam. (études de morphologie et de biologie florales). **[*Z. jujuba*—floral morphology and biology.]** [*Proceedings*] *2ª Conferência Internacional dos Africanistas Ocidentais 1947, Lisbon.* Vol. 2, 1950 (309–19). [F.]

1417. SAUER, E. Beobachtungen an zwittrigen Pappeln. **[Observations on androgynous Poplars.]** *Z. Forstgenet.* 3 (5), 1954 (89–91). 6 refs. [G.g.e.]

[Cf. *For. Abstr.* 15 (No. 3267).] A study of the androgynous flowers of a young *Populus tremula* at Stuttgart. Mention is also made of the occurrence of androgynous flowers on an adult *P. alba* (or possibly *P. alba* × *P. canescens*) and a young *P. candicans.*

1418. ANDERSSON, E. Några data om pollenvariationen och pollenfertiliteten hos gran och tall. **[Some data on pollen variation and pollen fertility in Norway Spruce and Scots Pine.]** *Svensk PappTidn.* 57 (7; 18), 1954 (242–55; 654–76). 13 refs. [Sw.E.] P.R.

Investigations were made on variation in pollen breadth and length in different parts (height and compass direction) of tree crowns (10 Spruce in a stand, and 10 each of isolated Spruce and Pine), from different trees and stands (6 stands of Spruce, 15 trees from each; and 4 stands of Pine, 20 trees from each; 5 Spruce stands at different altitudes; plus some small-scale supplementary material), and from and within 6 different clones of Pine. Results, in tables with English and Swedish legends, are statistically analysed. A significant difference in pollen form was found between different parts of the crown. For Spruce there was no proof that variation in pollen length between stands is greater than that between trees within stands, but in pollen breadth there was a significant difference between and within stands. For Pine there was no significant difference between stands. A statistically significant variation was found in pollen dimensions between altitudes. Significant differences were found between clones of Pine. Pollen fertility varied considerably within stands, but there were also certain variations between altitudes for Spruce.

165. *Phylogeny, Evolution. Heredity, Genetics and Breeding, Variation*

See also Nos. 1408, 1415, 1418, 1484, 1491, 1502, 1522, 1599, 1616–9, 1778, 1926, 1993.

1419. MATTHEWS, J. D. **Forest genetics.** *Rep. For. Res. For. Comm., Lond. 1952/53*, 1954 (56–60).

Four years of work on the rooting of dormant and summerwood cuttings is summarized and the future lines of work are indicated. The importance of the origin of the cuttings is stressed. The ability to develop roots varies, among other things, with the species and age of tree, and the position of the cuttings on it. Cuttings from mature Scots Pine, Corsican Pine, Oak, Ash, Beech etc. are difficult subjects at present. Experiments have shown that dipping the cuttings in a solution of 1 mg. of indolyl-butyric acid in 1 c.c. of 50% alcohol gives good results. The best conditions of soil temperature, air temperature, humidity and light for rooting cuttings are being investigated, and include sub-irrigation methods to replace overhead watering. Vermiculite and granulated peat, either alone or in mixture, have proved to be the best media so far tested for striking cuttings.

The general study of flowering and fruit production has been continued. Evidence is accumulating of a correlation between a good seed year in some species and warmer, drier, and sunnier-than-average weather during the summer *before* the flowers appear. The correlation is good in Corsican Pine, but in Larch and Beech it is often modified by spring-frost damage to the flowers, which can greatly reduce the seed crops.

1420. SCHRÖCK, O., and STERN, K. Prüfung des Wachstumsganges der Kiefer im Keimlingstest als Auslesemethode. **[Determining the course of growth of Scots Pine in seedling tests as a method of selection.]** *Züchter* 23 (4/5), 1953 (137–48). 20 refs. [G.g.] [Institut für Forstwissenschaften Eberswalde, Zweigstelle für Forstpflanzenzüchtung Waldsieversdorf.] E.M.B.

An account of preliminary experiments with the aim of discovering whether genetic differences in growth are detectable in the early seedling stage, e.g. the first 21 days after germination. For this purpose the authors derive mathematically a modification of Backmann's growth law [cf. *For. Abstr.* 14 (Nos. 1420–1)] applicable to the embryonic and early seedling stage, which can be plotted on arithmetic probability paper as a straight line when the growth increments are stated in % of some end value. Preliminary tests of the validity of this method were made with measurements on Pine seedlings (various progenies) germinated and cultured in the laboratory under controlled conditions. Results are given in graphs and discussed. Some of the test series gave figures showing a correlation between growth and seed weight, and also show a probability that it may be feasible to correlate differences in seedling

growth with differences in later life—and hence to test the products of selection and breeding at a very early stage. Suggestions are made for improving the statistical design of future experiments.

1421. HEJTMANEK, J. Příspěvek k otázce proměnlivosti borky u borovice lesní. **[On the variability of bark in *Pinus sylvestris*.]** *Preslia* 25 (1), 1953 (75–86 + plate). 6 refs. [Cz.cz.] A.P.B.

Discusses observations made in 1951 in Velká Fatra, and in 1952 N. of Mariánské Lazné and N. of Plzeň, concluding that variation in bark type (3 types are illustrated) is governed primarily by developmental stage of the tree, its rate of diameter growth, site, and genetic factors. Though the separate effects of these factors are difficult to isolate, it appears that the effect of stage of development on the gradual change to the ultimate plate type of bark is most marked in the younger ranges of age. This change is also correlated with a decline in diameter increment, though no clear correlation could be established between the latter and bark thickness. Thicker bark was found on deep, moist, rich soils than on poor soils. Compared with that of other factors, the influence of heredity is probably of minor importance.

1422. NORDSTRÖM, L. Om den inom vissa delar av vårt land dåliga talltypen—dess uppkomstsätt samt praktiska konsekvenser därav. **[The poor Pine types found in certain parts of Sweden, their origin and some effects in practice.]** *Norrlands SkogsvFörb. Tidskr.* 1954 (3), (435–87). 38 refs. [Sw.]

The poor Pine type of Uppland is attributed not to the negative selection exercised by felling the better trees over a relatively short historical period, but to exposure to wind over a period of some 6000 years from the end of the ice age, during the time that the land was gradually rising and the region was characterized by islands and skerries increasing in size until the land reached its present level. In view of this long period of negative selection, no attempt should be made to improve the local race by breeding, but regeneration should be carried out with seed-plants from other provenances. An examination of growth of these Pines and of samples in Småland on sites of equivalent quality class, using Spruce growth as a measure of comparison, shows that the difference in favour of the Småland Pines is considerable.

1423. MERGEN, F. **Self fertilization in Slash Pine reduces height growth.** *Res. Note Stheast. For. Exp. Sta.* No. 67, 1954. pp. 2.

Measurements on 5-year-old progeny obtained from a high-resin-yielding Slash Pine by controlled self and cross pollination and by free wind pollination, show a significantly lower average height in the selfed progeny. There were no apparent differences between progeny from the controlled cross pollinations and from wind pollination.

1424. **Breeding of [*Pinus*] species other than Monterey Pine.** *Rep. For. Timb. Bur. Aust. 1953*, 1954 (21).

During the year 6 new crosses were made, as follows: *P. attenuata* × *P. muricata* var. *remorata*, *P. radiata* × *P. muricata* var. *remorata*, *P. muricata* × *P. muricata* var. *remorata*, *P. radiata* × *P. attenuata*, *P. banksiana* × *P. contorta* (and reciprocal), and *P. coulteri* × *P. sabiniana*. In addition, the following crosses which had been made in 1952 were repeated: *P. muricata* × *P. radiata*, *P. muricata* × *P. attenuata* and *P. banksiana* × *P. contorta*. Seed was collected as a result of pollinations made in 1951, and this was sown. Seed of the cross *P. ponderosa* × *P. latifolia* germinated successfully, but the *P. halepensis* × *P. radiata* seed failed. Seedlings raised from crosses made in 1950 were planted out; these included the possible hybrid *P. canariensis* × *P. longifolia* and the hybrid *P. patula* × *P. greggii*, both of which showed intermediate vigour in the nursery.

1425. MEYER, H. Zur Blasenrost-Resistenzzüchtung mit *Pinus strobus*. **[Breeding for blister-rust resistance in *P. strobus*.]** *Z. Forstgenet.* 3 (5), 1954 (101–4). 7 refs. [G.g.e.]

A report on (1) trials of resistant phenotypes from stands suffering from long-continued attack by *Cronartium ribicola*, and (2) crosses with *P. excelsa* and other Pines showing resistance. (1) In tests of vegetatively propagated clones from 32 selected trees, 4 clones proved non-resistant. It is important in such tests that the material should be sufficient to allow for losses. (2) A 17-year-old *P. strobus* × *P. excelsa* at Hann. Münden is described. This tree is resistant to *C. ribicola* and shows remarkably good growth. The artificial cross *P. strobus* × *P. excelsa* was successfully made.

1426. HEITMÜLLER, H.-H. Beobachtungen über individuelle Resistenz gegen *Gilletteella cooleyi* Gill. an Douglasie. **[Individual resistance in Douglas Fir to attack by *Adelges cooleyi*.]** *Z. Forstgenet.* 3 (5), 1954 (99–100). 8 refs. [G.g.e.]

Observations over several years in a Douglas Fir stand in the Lonau Forest District (Harz) revealed an individual of *f. caesia* which is resistant to attack by *A. cooleyi*. Progeny of this tree propagated by cuttings showed the same resistance.

1427. SCHAD, C., SOLIGNAT, G., GRENTE, J., and VENOT, P. Recherches sur le châtaignier à la Station de Brive. **[Research on Chestnut at Brive research station.]** *Annales de l'Amélioration des Plantes, Paris* 2 (3), 1952 (369–458). 39 refs. [F.f.] E.M.B.

A report summarizing the work of the station in breeding Chestnut for resistance to ink disease and canker.

1428. CLAPPER, R. B. **Chestnut breeding, techniques and results. 1. Breeding material and pollination techniques. 2. Inheritance of characters, breeding for vigour and mutations.** *J. Hered.* 45 (3; 4), 1954 (107–14; 201–8). 14 refs. O.R.S.

Material and techniques are discussed in detail. Results include the following: (1) First-generation hybrids from crossing a selection of *Castanea mollissima* with *C. dentata* appear promising for forest timber trees. On a poor site they have grown at the rate of 2·8 ft./year for 10 years. They are sufficiently blight-resistant to warrant testing on forest sites. (2) The mutation causing cracks in the

bark of trees from 3–4 years appeared in first-generation hybrids from a *C. mollissima* × *C. dentata* cross. Stunted growth, drooping branches and increased susceptibility to blight and winter injury are associated with cracked bark. (3) Chestnuts, Chinkapins and hybrids graft readily but are difficult to bud. No efficient method of rooting cuttings has been developed.

1429. REGENT, B. Prilog poznavanju uzgoja biljaka iz ploda pitomog kestena i maruna. **[Development of seedlings from seed of wild and cultivated *Castanea sativa*.]** *Šum. List* 78 (8), 1954 (379–86). 9 refs. [Croat.croat.e.g.]

Measurements made in 1952 and 1953 on seedlings of *C. sativa* from seeds of (*a*) cultivated and (*b*) wild trees showed that 1- and 2-year-old seedlings of (*a*) averaged respectively 2·2 and 2·4 cm. higher than those of (*b*); differences in diam. were insignificant. Plants of both strains withstood frost of − 11° C. The populations measured were ca. 850 each of 1-year plants, and ca. 300 each of 2-year plants.

1430. SHULL, G. H. **Chloralbinism in the Burr Oak (*Quercus macrocarpa* (Michx.)) and its putative modification through grafting.** *Abstr.* in *Genetics, Madison* 38, 1953 (690–1). (1953 Meeting, Genetics Society of America.) C.G.B.

Describes experiments in raising plants from seed of a *Quercus macrocarpa* liable to produce albino seedlings. The results indicate that the tree in question is a heterozygote. Grafting experiments failed to establish any parasitic relationship between the albinos and their green sibs.

1431. GOLIKOV, A. I. Formy greckogo oreha v Soči-Tuapsinskom raïone i principy ih otbora. **[Forms of *Juglans regia* in the Sochi-Tuapse region and principles for selection.]** *Lesn. Hoz.* 5 (1), 1952 (62–6). [Russ.]

Selection of élite Walnuts growing in the mountain woodlands of the Sochi Experimental leskhoz has been based on nut quality, which is judged by 9 criteria (listed). The object of selection has been to provide seed for the creation of seed orchards.

1432. KOPECZKY, F. Erdészeti genetika és hazai nyárnemesítés. **[Forest genetics and plant breeding in Hungary.]** *Erdészeti Tudományos Intézet Évkönyve, Budapest* 2, 1952 (1954), (51–65). [Hu.] From *abstr.* in *Hung. agric. Rev.* 3 (3), 1954 (8). [E.] C.G.B.

The practical forester, who cannot wait very long for suitable material, is generally satisfied with F_1 hybrids, particularly with Poplars whose vegetative propagation is easy. In Hungary, the chief aims of Poplar breeding are the raising of drought-resistant strains of good stem form for the Alföld, and the improvement of the native species by, e.g., the crossing of selected ecotypes. Careful study has shown the importance of stigma development in determining the proper time for pollination; and the necessity for fine-spray watering of the young seedlings, which are easily overturned by rain. In leaves of upper branches, the stomata and epidermal cells are smaller and closer together, the nervation denser and the palisade tissue better developed, than in the lower, older leaves. The difference in the quantity of stomata and epidermal cells in May and August foliage ('xeromorphic gradient') was found to be greatest in the section *Leuce* (e.g. *P. bolleana*) and lowest in *P. fremontii*.

1433. SHEA, K. R., and RIKER, A. J. **Breeding Poplars for disease resistance.** *Abstr.* in *Phytopathology* 44 (9), 1954 (505).

Flowering in dense stands of adult *Populus grandidentata* was stimulated by stem girdling. Indoors, flower development on cut branches was promoted by storing 4-ft. branches, after leaf-bud removal, at 20° C. and at relative humidities (r.h.) > 40%; the branch butts were trimmed at frequent intervals and the water changed regularly. Aspen seeds remained more than 75% germinable after 18 months' storage at 4° C. and ca. 1% r.h. Seedling damping-off was prevented by using a pulverized sphagnum moss substrate. Soil drenches with formalin or with boiling water also controlled damping-off. Observations on over 4000 hybrid seedlings since 1952 have shown striking differences in growth rates, branching, leaf types, tree form and susceptibility to diseases, insects and rodents.

1434. VLOTEN, H. VAN. Jeugdgroei van nakomelingschappen uit kruisingen met *Leuce*-populieren, een generatieve toetsing van daarbij gebruikte ouders. **[Juvenile development of progenies from crosses between Poplars of the section *Leuce*, a breeding test of the parent trees.]** *Korte Meded. Bosbouwproefsta., T.N.O., Wageningen* No. 22, 1954. pp. 6 + 1 gph. 2 refs. [Du.e.] (*Repr.* from *T.N.O.-Nieuws, 's-Gravenhage* No. 99, 1954 (195–200).)

Discusses the results of measurements of mean cylinder volume (mean b.a. × mean height) over two years on seedlings obtained in 1950 from intraspecific crosses of *P. tremula* of different Netherlands and Polish provenance and interspecific crosses of *P. tremula* (Netherlands and Poland) with *P. alba* and *P. canescens* (♀ Netherlands) and *P. tremuloides* (♂ U.S.A.). The following preliminary conclusions are drawn: (1) *Intraspecific crosses*: Considerable genetic differences exist, cylinder volume of *P. tremula* Poland No. 23 × *P. tremula* Netherlands No. 8 being only 42–43% of that of Poland No. 23 × Netherlands No. 14. Crosses of Dutch individuals produced the worst, Dutch *P. tremula* ♀ × Polish *P. tremula* ♂ intermediate, and Polish *P. tremula* ♀ × Dutch *P. tremula* ♂ the best results. (2) *Interspecific crosses*: All crosses of *P. tremula*, especially one of Polish origin, with *P. tremuloides*, gave good results. *P. alba* × *P. tremuloides* gave better growth than *P. alba* × *P. tremula*, and progenies of the latter were susceptible to *Melampsora* rust. The stem form of progenies from *P. alba* or *P. canescens* was inferior to that of those having the Polish *P. tremula* as one parent. Further investigation is necessary.

1435. BOUVAREL, P., and FOURCHY, P. À propos du tremble des Alpes: les trembles de la Vallée du Ferrand (Isère). **[The alpine race of Aspens: the Aspens of the Vallée du Ferrand (Isère).]** *Rev. for. franç.* 6 (10), 1954 (601–3). 2 refs. [F.]

1436. NARITA, Y., and YOSHINAGA, K. **[Studies on breeding *Broussonetia* (I). The male flowers of 'Akaso' [a variety of] *B. kazinoki* Sieb.]** *J. Jap. For. Soc.* 36 (10), 1954 (291–4). [Jap.jap.e.]

Male flowers of Akaso, one of the most useful varieties of *B. kazinoki*, were found for the first time in ♀ inflorescences. No morphological differences were found between these flowers and those of Aoso, another variety bearing ♂ and ♀ flowers. The pollen grains of Akaso were slightly smaller but not significantly so. Akaso pollen was normally fertile and Akaso × Akaso crosses have yielded 9 berries and 111 seeds.

1437. RAO, H. S. **Chromosome numbers in forest plants.** *Indian For.* 80 (9), 1954 (551–2 + 3 sets of drawings). 2 refs.

Deals with some 20 species of trees and shrubs found in India and a few cultivated plants for comparison.

1438. NEWCOMER, E. H. **The karyotype and possible sex chromosomes of *Ginkgo biloba*.** *Amer. J. Bot.* 41 (7), 1954 (542–5). 10 refs. O.B.D.

1439. LEE, C. L. **Sex chromosomes in *Ginkgo biloba*.** *Amer. J. Bot.* 41 (7), 1954 (545–9). 5 refs. O.B.D.

The ♂ and ♀ trees of *G. biloba* have the same chromosome number ($2n = 24$) with almost identical chromosome morphology. The only difference is that, in the ♀ tree, 4 chromosomes of the somatic complement bear satellites, while in the ♂ tree only 3 chromosomes show satellites. An *xy* type of sex determination is therefore assumed, since the heteromorphic pair of chromosomes in the ♂ is the only feature differing from the condition in the ♀. A count of satellite-bearing chromosomes obtained from stem-tip and leaf-primordia smears could be of practical value in differentiating the sexes in young plants. *From author's summary.*

1440. YANAGISAWA, T. **[F_1 hybrids between *Picea jezoensis* and *P. glauca*.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 70, 1954 (57–70). 12 refs. [Jap.e.]

Describes, with illustrations, characteristics of the cones and needles of the hybrids. The % of full seeds is very low, with a maximum of 2%. *From author's summary.*

1441. CLIFFORD, H. T. **Analysis of suspected hybrid swarms in the genus *Eucalyptus*.** *Heredity* 8 (2), 1954 (259–69). 10 refs. [University of Melbourne.] O.R.S.

Several stands of trees with characters intermediate between *E. elaeophora* and *E. goniocalyx* were studied. Segregation of characters amongst the seedlings from individual 'intermediate' trees suggested that they were of hybrid origin. Further support for this interpretation was afforded by field studies, which showed that 'intermediate' trees only occurred where both species were growing near together. The means and variances of the length/breadth ratios of the seedling leaves for the progeny of selected trees have been used to illustrate a possible method of determining the parentage of hybrid swarms. *From author's summary.*

1442. DILLEMANN, G., and POUCQUES, M.-L. DE. Le pollen du *Sorbus latifolia* Pers. et son origine hybride. **[Pollen of *S. latifolia* and its hybrid origin.]** *Bull. Soc. bot. France* 101 (5/6), 1954 (239–40). 17 refs. [F.] O.B.D.

A study of the pollen grains confirms the hybrid origin of *S. latifolia*.

166. *Economic Botany (General)*

See also section 892.

1443. GARDNER, C. A., and BENNETTS, H. W. **Poison plants of Western Australia, Ironwood.** *Leafl. Dep. Agric. W. Aust.* No. 2165, 1954. (*Repr.* from *Journal of Agriculture of Western Australia, Perth (Ser. 3)*, 3 (4), 1954 (395–8).)

Erythrophleum chlorostachys: its habit, distribution, toxicity and toxic principle, with plate of flowers, pods and leaves.

168. *Histology*

See Nos. 1406, 1432, 1462, 1499, 1917–8, 2132 *et seq.*

17. SYSTEMATIC BOTANY

172.3. Bacteria and Blue-green Algae

See No. 1894.

172.4. Myxomycetes (Slime Fungi)

1444. ALEXOPOULOS, C. J. **Myxomycetes developed in moist chamber culture on bark from living Florida trees: with notes on an undescribed species of *Comatricha*.** *Quarterly Journal of the Florida Academy of Sciences, Gainesville* 16 (4), 1953 (254–62). 6 refs. L.S.

Of 271 pieces of bark collected from 35 individual trees representing 16 species, 66 pieces yielded fructifications of Myxomycetes. These are listed with comments.

172.8. Eumycetes (True Fungi)

See also Nos. 1547, 1887 *et seq.*, 2362 *et seq.*

1445. CEJP, K., and SKALICKÝ, V. Plodná padlí na dubech v Československu, *Microsphaera alphitoides* Griffon et Maublanc a *Phyllactinia roboris* (Gachet) Blumer. **[The ascigerous stages of the powdery mildews *M. alphitoides* and *P. roboris* on Oaks in Czechoslovakia.]** *Preslia* 26 (1), 1954 (43–54 + plate). 74 refs. [Cz.russ.e.] E.M.B.

In autumn 1952, after the dry summer, cleistocarps of *M. alphitoides* were found in central and western Bohemia and in central Moravia. Records of the occurrence of this stage in Europe are summarized. Cleistocarps of *P. roboris* were found on herbarium material of *Quercus cerris* (a new host for this species) collected in central Slovakia in 1881.

1446. GREMMEN, J. **Some noteworthy Discomycetous fungi on coniferous hosts.** *Sydowia, Annales Mycologici Ser. II, Horn* 7 (1/4), 1953 (141–5). 7 refs. [E.] L.S.

Phragmonaevia gigaspora sp. nov. on *Pinus cembra* in the Tyrol, *Chloroscypha cryptomeriae* on dead leaves of *Cryptomeria japonica* near Wageningen, and

Pseudographis pinicola on bark of *Abies alba* in the Black Forest.

1447. Šebek, S. **Monograph of the Central European species of the genus *Scleroderma* Pers.** *Sydowia, Annales Mycologici Ser. II, Horn* 7 (1/4) 1953 (158–90). 87 refs. [E.cz.] L.S.

1448. Talbot, P. H. B. **The genus *Stereum* in South Africa.** *Bothalia* 6 (2), 1954 (303–38). Many refs.

A critical revision, with key to S. African species.

1449. Baxter, D. V. **Some resupinate Polypores from the region of the Great Lakes. XXIII–XXV.** *Reprs.* from *Pap. Mich. Acad. Sci.* 37, 1951 (1952), (93–110 + 18 plates), 13 refs.; 38, 1952 (1953), (115–23 + 5 plates), 10 refs.; 39, 1953 (1954), (125–38 + 6 plates), 17 refs.

(23) Discusses a number of North American and European Polypores with special reference to their occurrence and distinguishing features. [Cf. *For. Abstr.* 14 (No. 1654).]

(24) Deals mainly with *Poria weirii*, its distribution, occurrence and responses to various environments. This species is no longer considered to be specific to *Thuja plicata*, and the existence of races not yet recognized must be envisaged.

(25) Discusses the occurrence of populations with reference to hosts, moisture and humidity, local conditions, temperature, and land and water barriers, and presents descriptions of *Polyporus cuneatus*, *P. leucospongia*, *P. fibrillosus*, and *Poria luteo-alba*.

174. *Spermatophyta, Seed-Plants in General. Floras and Check-Lists*

See also Nos. 1337, 1400, 2132 *et seq.*

1450. Wyatt-Smith, J. **Suggested definitions of field characters for use in the identification of tropical forest trees in Malaya.** *Malay. Forester* 17 (4), 1954 (170–83 + 46 photos). 14 refs.

A re-written and enlarged version of the unpublished MS. 'Field characters of forest trees', written in 1950 and referred to by De Rosayro in his paper on the subject [cf. *For. Abstr.* 15 (No. 107)]. It is illustrated by a number of photographs showing bark characters and buttress formations.

1451. Wyatt-Smith, J. **Manual of Malayan timber trees: 4. Sapotaceae; 5. Lauraceae.** *Res. Pamphl. For. Res. Inst. Kepong* Nos. 4–5, 1954. pp. 56 + 7 plates; 64 + 13 plates.

[Cf. *For. Abstr.* 15 (No. 3282).] No. 4 gives information on *Achras zapota*, and spp. of *Bassia*, *Chrysophyllum*, *Ganua*, *Lucuma*, *Madhuca*, *Manilkara*, *Mimusops*, *Palaquium*, *Payena*, *Planchonella*, and *Sideroxylon*. No. 5 covers *Actinodaphne*, *Alseodaphne*, *Beilschmiedia*, *Cinnamomum*, *Cryptocarya*, *Dehaasia*, *Litsea*, *Nothophoebe*, and *Phoebe*.

1452. **A.E.T.F.A.T.—index. 1953. Index of the papers on systematic phanerogamy and of the new taxa concerning Africa south of the Sahara.** Association pour l'Étude taxonomique de la Flore de l'Afrique tropicale, Bruxelles. 1954. pp. [70]. [F.E.] Price *Fr. Belg.*50 (*Fr. French* 350; 7*s.*).

Names are listed in alphabetical order of families, genera and species. The list includes nearly 2000 references for 1953 on new taxa, with geographical distribution, new combinations and names, revisions of families, genera and critical species, and papers of taxonomic interest. Over 60 periodical and serial publications are cited. A list is to be published annually.

1453. Jacques-Félix, H. Éléments floristiques nouveaux ou méconnus des montagnes du Cameroun Français. **[New or unrecognized species from the mountains of the French Cameroons.]** [*Proceedings*] *2ª Conferência Internacional dos Africanistas Ocidentais 1947, Lisbon* Vol. 2, 1950 (157–65). [F.]

Notes on certain species of the French Cameroons that are of interest for one of two reasons: (1) the same species also exist in regions remote from the country of study, or (2) they are related to such species. Certain species are also noted that do not appear in Hutchinson and Dalziel's 'Flora of West Tropical Africa' although they have been reported in various journals.

1454. Wild, H. **A Southern Rhodesian botanical dictionary of native and English plant names.** Government Printer, Salisbury, S. Rhodesia. 1953. pp. viii + 139. 5 refs. Price 10*s.* 6*d.*

Contains two lists, the first mainly in the Shona, Tonga, Nguni, Ndebele, and Lozi languages with > 2000 equivalents of the > 700 botanical names given with field descriptions in the second list.

1455. Pardy, A. A. **Notes on indigenous trees and shrubs in Southern Rhodesia.** *Reprs.* from *Rhod. agric. J.* 51 (2; 4; 5), 1954. Each pp. [1 or 2] + 2 or 3 plates. (*Bull. Minist. Agric. Lds., S. Rhod.* Nos. 1758–1761; 1775–1778; 1787–1790.)

Acacia robusta, *Cordyla africana*, *Guibourtia conjugata*, *Oxytenanthera abyssinica*; *Strychnos pungens*, *Anthocleista zambesiaca*, *Rauwolfia inebrians*, *Swartzia madagascariensis*; *Acacia heteracantha*, *A. rehmanniana*, *Cussonia umbellifera*, *Erythrina caffra*.

1456. Aristeguieta, L. Árboles de Venezuela. **[Trees of Venezuela.]** *Agric. venez.* 19 (168; 169), 1954 (22–5; 22–6). [Span.] A.P.B.

(*a*) Apamate (*Tabebuia pentaphylla*); (*b*) Castaño (*Pachira insignis*).

1457. Aristeguieta, L. Clave y descripción de la familia de los árboles de Venezuela. **[Key to and description of the families of Venezuelan trees.]** Instituto Botánico, Dirección Forestal, Ministerio de Agricultura y Cría, Caracas. 1954. pp. 307. [Span.]

Includes also a glossary of terms used and a list of vernacular names.

1458. Hildebrand, F. H. Boomnamenlijst van Tapanuli (Noord-Sumatra). **[List of tree species from Tapanuli (N. Sumatra).]** *Rapp. Bosbouwproefsta., Bogor* No. 67, 1954. pp. 52. [Jav.Du.E.]

The list is in 2 parts arranged (1) by local names and (2) under family, genus and species. Each part gives the local name, its language or dialect, scientific name and durability class of the wood.

174.2/.7. Gymnosperms

See also Nos. 1407–8, 1440.

1459. Numero speciale dedicato alle conifere italiane. **[Special number devoted to Italian conifers.]** *Monti e Boschi* 5 (11/12), 1954 (483–585). [It.f.e.]

Contains the following: Botanical notes on the Coniferae, and general accounts of *Abies alba*, *Pinus pinea*, *P. pinaster*, *P. halepensis*, *Cupressus sempervirens*, and *Taxus baccata* (by *A. Pavari*); *Larix decidua*, *Pinus nigra* s.l., *P. heldreichii* (by *E. Allegri*); *Picea abies*, *Pinus sylvestris*, *P. mugo*, *P. cembra* (by *L. Susmel*); *Juniperus communis* (by *R. Morandini*). There are two tables, one showing sp. gr. of the woods of these conifers and the other with data on their seeds.

1460. Kupczyński, J. Jodła na wyżynie elbląskiej **[*Abies alba* on the Elbląg plateau [Poland].]** *Sylwan* 98 (3), 1954 (221–2). [Pol.]

Describes 'islands' of Fir of unknown origin growing near the town of Elbląg, ca. 250 km. north of the natural northern limit of the species. The oldest trees are 80–100 years old, and their general development points to (Schwappach) site class I. Fir was planted in this region under canopy and in mixture on afforested sites in 1951–53, so far with encouraging results.

1461. Hall, M. T. **Nomenclatural notes concerning *Juniperus*.** *Rhodora* 56 (668), 1954 (169–77). 7 refs. O.B.D.

Presents evidence to show that the calciphilous Juniper from central Texas has in the past been confused with a Juniper from the mountains of central Mexico. The Texan species is properly *J. ashei*.

1462. Vidaković, M. Prilog poznavanju anatomije iglica kod nekih srodnih borova. **[On the needle anatomy of some allied *Pinus* species.]** *Glasn. šumske Pokuse* 11, 1953 (163–79 + 2 tbls.). 15 refs. [Croat.croat.g.]

A comparative study shows that some diagnostic differences exist between the anatomical features of the needles of *Pinus halepensis* and *P. h.* var. *brutia*. Diagnostic differences in needle anatomy also exist in *Pinus mugo* from different localities.

1463. Schmid, E. Die aufrechten Bergföhren in der Schweiz. **[*Pinus mugo* var. *erecta* in Switzerland.]** *Schweiz. Beitr. Dendrol.* No. 3, 1951 (9–13). [G.f.]

Discusses the distribution of this variety, and argues that it is a hybrid between *P. mugo* and *P. sylvestris*.

176.1. Dicotyledons

See also Nos. 1409, 1441–3, 1496, 1721.

1464. Camus, A. Les chênes: Monographie des genres *Quercus* et *Lithocarpus*. III. Sous-genre *Euquercus* (sections *Protobalanus* et *Erythrobalanus*) et genre *Lithocarpus*. **[The Oaks: Monograph of the genera *Quercus* and *Lithocarpus*: III. Subgenus *Euquercus* (sections *Protobalanus* and *Erythrobalanus*) and genus *Lithocarpus*.]** Paul Chevalier, 12 Rue de Tournon, Paris VI^e^. 1952–4 (1954). In 2 parts, pp. 1314. Many refs. [F.]

The atlas to Vol. III appeared in 1948 [cf. *For. Abstr.* 11 (No. 2592)]. The present instalment consists of the text and completes the work.

1465. Kitamura, S., and Horikawa, T. ***Quercus* subgenus *Lepidobalanus* in Japan, Korea and North China.** *Memoirs, College of Science, University of Kyoto* 20*B* (1), 1951 (20–1). [E.] From *abstr.* in *Jap. Sci. Rev.* (*biol. Sci.*) No. 2, 1952 (95). I.I.E.

Many natural hybrids were found among plants previously considered distinct species. A key to the sections *Ilex* and *Cerris* is given.

1466. Vasconcellos, J. de Carvalho e, and Franco, J. do Amaral. Carvalhos de Portugal. **[Oaks of Portugal.]** *Repr.* from *An. Inst. Agron., Lisboa* 21, 1954 (1–135 + 6 plates). 29 refs. [Port.]

[Cf. *For. Abstr.* 16 (No. 158).] Describes the principal characteristics used in identifying native Portuguese *Quercus* spp., and presents a key to and descriptions of the species with a list of vernacular names.

1467. Gagnepain, F. Caesalpiniées nouvelles d'Indochine. **[New Caesalpinioideae from Indo-China.]** *Bulletin du Museum National d'Histoire Naturelle, Paris* 24 (3), 1952 (317–20). [F.] L.S.

Erythrophleum angustifolium, *Cynometra glomerulata*, *Mezoneuron keo*, *M. nhatrangense*, *M. oxyphyllum*, *Sindora kontumensis* and *S. laotica*.

1468. Keay, R. W. J. **Revision of the 'Flora of West Tropical Africa', VI.** *Kew Bull.* 1954 (2), (263–75).

Includes descriptions of 3 new species of *Berlinia*.

1469. Dwyer, J. D. **The tropical American genus *Tachigalia* Aubl. (Caesalpiniaceae).** *Ann. Mo. bot. Gdn.* 41 (2), 1954 (223–60 + 1 plate). O.B.D.

A taxonomic study with a key to the species. The following new species are described: *Tachigalia bracteolata*, *T. venusta*, *T. pulchra*.

1470. Duvigneaud, P. Le genre *Geissaspis* dans le Congo méridional et les pays limitrophes. **[The genus *Geissaspis* in the southern Congo and neighbouring countries.]** *Bull. Soc. Bot. Belg.* 86 (2), 1954 (145–205). 9 refs. [F.] O.B.D.

A taxonomic study.

1471. Hauman, L. Quelques Papilionacées-Galégées nouvelles de la flore congolaise. **[Some new Papilionaceae-Galegeae from the Congo.]** *Bull. Soc. Bot. Belg.* 86 (2), 1954 (275–82). [F.] O.B.D.

Includes accounts of the following new tree species: *Millettia hylobia*, *M. stenopetala*, and *Platysepalum chevalieri* var. *aureum*.

1472. Raizada, M. B., and Chatterji, R. N. **A diagnostic key to the various forms of introduced Mesquite (*Prosopis juliflora* DC.).** *Indian For.* 80 (11), 1954 (675–80). 17 refs.

1473. Buchinger, M., and Falcone, R. Nota preliminar sobre las especies argentinas del género *Cedrela* L. **[Preliminary note on the Argentine species of *Cedrela*.]** *Darwiniana, B. Aires* 10 (3), 1953 (461–4). [Span.] A.P.B.

Cedrela balansae is cited as new to the Argentine flora; the name *C. tubiflora* is accepted for 'Cedro misionero' with two forms, f. *grandifolia* and f. *parvifoliola*.

1474. HOTTA, T. **Taxonomical study on the Wild Mulberry in Japan and near countries. (2).** *Bot. Mag., Tokyo* 66 (781/782), 1954 (177–80). [E.] I.M.I.

Keys out and describes the varieties and forms of *Morus australis* Poir. for which *Morus indica* Roxb. (non Linn.) is given as a synonym.

1475. Les *Eucalyptus* dans les reboisements. **[Eucalypts for afforestation.]** *FAO For. & For. Prod. Stud.* No. 11, 1954. pp. 395. 10 pp. of refs. [F.]

Contains sections on: *Eucalyptus* in Australia, with particulars of Australian climate and forest types; introduction of *Eucalyptus* spp. into other parts of the world—the Mediterranean, N. America, S. America, Africa (other than the Mediterranean coast), Asia and New Zealand; systematics; monographs on individual species most useful for afforestation—the main section covering some 70 species and giving details of botany with illustrations of buds, leaves and fruit, natural distribution, introduction into other countries and silvicultural requirements; the adaptability of Eucalypts to site factors and climate; establishment and early care of stands; uses of wood and bark, and essential oils; and treatment of stands, line plantings, farm woodlands, shelterbelts etc.

1476. POURTET, J. Voyage d'étude des *Eucalyptus* au Maroc (22–30 Oct. 1954): Rapport d'activité du groupe de travail français de l'*Eucalyptus*. **[Eucalypt study tour in Morocco (22–30 Oct. 1954): Report of French Eucalypt working party.]** [*Docum.*] *FAO Jt. Subcomm. Medit. For. Probl.* No. *FAO/SCM/EU/2A*, 1954. pp. 14. [F.]

An account of research in progress, with a list of the *Eucalyptus* spp. under trial in France.

1477. GOES, E. DA S. REIS. Études faites et études en cours sur les *Eucalyptus* au Portugal. **[Research completed and in progress on *Eucalyptus* in Portugal.]** *Estud. Inform. Serv. flor. aqüic. Portugal.* No. 37–*A*8, 1954. pp. 14 + 3. 15 refs. [F.] Limited distribution.

Summarizes briefly the most important Portuguese publications on *Eucalyptus* from 1876 to 1954, and presents an outline of work now in progress.

1478. GOES, E. DA S. REIS. Étude monographique des *Eucalyptus* au Portugal. **[Monograph of *Eucalyptus* in Portugal.]** *Estud. Inform. Serv. flor. aqüic. Portugal* No. 38–*F*3, 1954. pp. 10 + 1 map. [F.] [Report presented to the *Eucalyptus* study tour in Morocco.] Limited distribution.

Deals briefly with the history of the introduction of *Eucalyptus* spp. into Portugal, areas now carrying *Eucalyptus* (with a map), methods of cultivation, yields and utilization.

1479. GOES, E. DA S. REIS. Inventaire des espèces d'*Eucalyptus* existant au Portugal. **[Inventory of *Eucalyptus* spp. in Portugal.]** *Estud. Inform. Serv. flor. aqüic. Portugal* No. 39–*F*9, 1954 pp. 25 + 1 map + 12 gphs. [F.] Limited distribution. [Report presented to the Eucalyptus study tour in Morocco, October, 1954.]

E. globulus and *E. rostrata* are the only Eucalypts widely planted in Portugal, but some valuable collections exist, containing many different species. Annotated lists are presented of the species in the most important collections, with a map and some climatological data.

1480. CHAPMAN, E. F. **Cyprus Eucalypts: a report on the *Eucalyptus* species found growing in Cyprus, 1953.** Cyprus Government Printing Office, Nicosia. 1954. pp. iv. + 56 + 4 gphs. Price 5*s*.

An enlarged version of an earlier publication [cf. *For. Abstr.* 13 (No. 1013)] which is now superseded. It describes 27 species compared with 18 in the earlier version, and includes climatic data.

1481. GARDNER, C. A. **Trees of Western Australia. 25—Marri (*E*[*ucalyptus*] *calophylla* R. Br. ex Lindl.). 26—Spring Bloodwood (*E. ptychocarpa* F. Muell.). 27—Twin-leaved Bloodwood (*E. perfoliata* R. Br. ex Benth.).** *Leafl. Dep. Agric. W. Aust.* No. 2151, 1954. pp. 7. (*Repr.* from *Journal of Agriculture of Western Australia, Perth* (*Ser. 3*), 3 (3), 1954 (301–7).)

1482. GARDNER, C. A. **Trees of Western Australia: 28—Four northern Bloodwoods. (*Eucalyptus ferruginea, E. zygophylla, E. setosa, E. abbreviata.*)** *Leafl. Dep. Agric. W. Aust.* No. 2169, 1954. pp. 7. (*Repr.* from *Journal of Agriculture of Western Australia, Perth* (*Ser. 3*), 3 (4), 1954 (419–25).)

1483. PERRIER DE LA BÂTHIE, H. Sur le genre *Androya* gen. nov. (Oleaceae) de Madagascar. **[The new genus *Androya* (Oleaceae) from Madagascar.]** *Bulletin du Museum National d'Histoire Naturelle, Paris* 24 (4), 1952 (400–1). [F.] L.S.

The new genus is intermediate between *Ligustrum* and *Comoranthus*. The single species *A. decaryi* is a small evergreen tree 7–10 m. in height.

1484. KOLTAY, G. A 'gazdasági' nyárfajták rendszere. **[Systematization [designation] of 'economic' Poplars.]** *Erdészeti Tudományos Intézet Évkönyve, Budapest* 2, 1952 (1954), (69–74). [Hu.] From *abstr.* in *Hung. agric. Rev.* 3 (3), 1954 (8). [E.] C.G.B.

The author suggests dividing Poplars into the following 3 groups, from the point of view of Poplar breeders and planters: (1) selected forms and (2) polyploid forms, of natural species, and (3) hybrids of all kinds. For clones of group (1) the name should include the initials of the country where raised and the registration number, e.g. *P. canescens* H. 131; for clones of group (2) the same, plus their chromosome number (e.g. a triploid Poplar may be *P. alba* 3*n* H. 582); clones of (3) should be designated by the names of their parents connected by the symbol x (the father, if unknown, by ?) and vegetative hybrids by vx. Some further suggestions on the designation of hybrids are appended.

1485. FOURNIER, P. Histoire du *Populus euphratica* Oliv. **[History of *P. euphratica*.]** *Bull. Soc. bot. France* 101 (1/2), 1954 (6–8). [F.] O.B.D.

A review based on literature.

1486. STAFLEU, F. A. **Novitates Vochysiacearum. I.** *Acta bot. neerland.* 3 (3), 1954 (405–11). O.B.D.

Has descriptions of the following new tree species: *Vochysia cassiquiarensis, V. elegans, V. megalophylla, V. laxiflora, V. cipoana, V. obovata.*

18. PLANT ECOLOGY

1487. PAVARI, A. Baśi ecologiche e tecniche della selvicoltura nei paesi mediterranei. **[The ecological and technical bases of forestry in Mediterranean countries.]** *Monti e Boschi* 5 (10), 1954 (435–52). [It.f.e.]

An abridgement of a lecture given in German at Hann. Münden.

181. *Mode of Life, Autecology. Silvicultural Characters of Trees*

See also Nos. 1451, 1475–80, 1572, 1575, 1613, 1716, 1771, 1877, 2112, 2131.

1488. LAMPRECHT, H. Pino laso. **[*Podocarpus rospigliosii.*]** *Bol. Ingen. for. Univ. Los Andes* 1 (4), 1954 (33 + 1 photo). [Span.]

Notes on the tree, its distribution in Venezuela, silvicultural requirements and management.

1489. HOFMAN, J. Tisy v Gaděrské dolině. **[Yew-trees in the Gaděr valley [Slovakia].]** *Práce výzkum. Úst. lesn. ČSR* No. 3, 1953 (183–203). 6 refs. [Cz.russ.g.]

Out of the total of ca. 180,000 Yew trees supposed to grow in the southern part of Velka Fatra, ca. 17,000 grow, in several patches totalling 645 ha., in the Gaděr valley, in mixture with either Beech/Silver Fir, or Spruce with Beech and Fir, or as relict forests with Larch, Maple and Fir. The Yew's highest density is 100/ha.; trees occur most frequently at the 800–1100 m. level, the most favourable conditions being at 1000–1100 m. South exposures carry most, although the most favourable seems to be NE. The maximum density of trees/ha. occurs on less favourable sites. As regards stand composition, the most favourable for Yew is mixed Beech/Fir; the least favourable, Pine.

1490. DUPLAQUET, L. Le génévrier de l'est africain. **[The East African Juniper.]** *Rev. for. franç.* 6 (11), 1954 (647–8 + 2 photos). 5 refs. [F.]

A note on the distribution and silvicultural characters of *Juniperus procera.*

1491. De Japanse lariks (*Larix leptolepis* Gord.). **[Japanese Larch (*L. leptolepis*).]** *Ned. Boschb.-Tijdschr.* 26 (11), 1954 (276–343). [Du.e. or g.]

Contains the following papers, all in Dutch with German or English summaries, prepared for a meeting of the Nederlandsche Boschbouw Vereeniging, December 1954: Practical experience of its use [for afforesting heathlands] in Drente (*J. J. M. Jansen*). Practical experience in N. Brabant (*A. M. E. Papenhuijzen*). Its growth in the Netherlands [yield tables compared with those from W. Germany, Great Britain and Japan] (*J. van Soest*; 1 tbl.). Thinning (*A. van Laar*; 5 refs.). Assessing site quality with special reference to *L. leptolepis* (*J. Schelling*). Its growth in relation to site properties (*C. P. van Goor*; 13 refs.). Relationship between stem form and soil fertility (*H. Veenendaal*). Its climatic requirements (*B. Veen*; 5 refs.). Insect damage and loss of increment (*J. Luitjes*). Rotation, cost price and management profits (*J. H. Becking* and *A. van Laar*). The Scottish hybrids of *L. leptolepis* in the Netherlands (*H. van Vloten*).

1492. KADAMBI, K. ***Mesua ferrea*, Linn., its silviculture and management.** *Indian For.* 80 (9), 1954 (431–50 + 3 photos + 1 map). 34 refs.

Silvicultural characters, distribution, nursery practice etc., increment, and timber properties.

1493. KADAMBI, K. ***Terminalia arjuna*, Bedd.** *Indian For.* 80 (11), 1954 (692–9 + 1 photo + 1 map.). 41 refs.

Silvicultural characters, wood properties and utilization.

1494. KADAMBI, K. ***Terminalia catappa*, Linn., its silviculture and management.** *Indian For.* 80 (11), 1954 (718–20 + 1 photo + 1 map). 11 refs.

Distribution, silvicultural characters, wood properties and uses.

1495. KADAMBI, K. ***Terminalia paniculata* Roth. W. & A. Syn. *Pentaptera paniculata* Roxb. (Family: Combretaceae).** *Indian For.* 80 (10), 1954 (612–25 + 4 plates). 43 refs.

Distribution, ecology, silvicultural characters, increment, and wood properties.

1496. PAJCHL, J. Pěstování a šlechtění vrb. **[Growing and breeding of Willows.]** *Práce výzkum. Úst. lesn. ČSR* No. 4, 1954 (213–34). 13 refs. [Cz.russ.e.]

A general account of the genus *Salix*, with special reference to the species, hybrids etc. propagated in Czechoslovakia and their manifold economic uses.

181.1. Distribution, Natural Range

1497. SOČAVA, V. B., and LUKIČEVA, A. N. K geografii kedrovogo stlanika. **[The geographical distribution of *Pinus pumila.*]** *Dokl. Akad. Nauk SSSR* 90 (6), 1953 (1163–6). 8 refs. [Russ.] A.P.B.

Discusses present distribution, with a sketch-map, and probable history of the migration of this species—apparently westward from the Pacific coast regions.

1498. FUKAREK, P. Poljski jasen (***Fraxinus angustifolia* Vahl**). *Šum. List* 78 (9/10), 1954 (433–53). 56 refs. [Croat.e.]

Includes two maps showing the distribution of *F. angustifolia* in the Mediterranean lands and in Jugoslavia. The large floodland forests of the Jugoslavian part of the Pannonian valley and floodlands of other rivers (Sava, Drava, Morava) were found by the author to have this species and not *F. excelsior.* A detailed description of *F. angustifolia* is given.

181.2. Atmospheric Relations. Acclimatization

See also Nos. 1402, 1523, 1527, 1602 *et seq.*, 1854, 1859.

1499. GRANDGIRARD, A. Observations sur la structure anatomique de plantules de *Quercus pedunculata* cultivées sous des éclairements relatifs différents. **[The anatomical structure of seedlings of *Q. robur* grown under different relative light intensities.]** *Abstr. of thesis*, in *Bull. Soc. for. Franche-Comté* 27 (3), 1954 (147–8). [F.]

The plants were grown in identical conditions but submitted to relative light intensities (r.i.) of 100, 50,

15 and 2%. Plants grown in the greater r.i. showed greater shoot diameter, larger and thicker leaves, a more extensive root system, better developed epidermal cells with thicker cell walls, a greater number of stomata, longer and more closely packed palisade cells, larger and more numerous vessels, more cork and pericycle fibres, and a large number of Ca oxalate crystals: the plants were altogether more vigorous, with more fully developed tissue substance than those grown in shade. Anatomical development was best at 100% but was good also at 50% r.i., which would be more favourable silviculturally.

1500. Bałut, S. Próba wykorzystania zjawisk fotoperiodycznych do badań rozwoju stadialnego roślin drzewiastych. [**An attempt at making use of photoperiodic phenomena for examining the development stages of woody plants.**] *Sylwan* 98 (3), 1954 (193–9). 17 refs. [Pol.russ.]

Presents the results of experiments designed to assess the effect of different photoperiods on the annual phenological cycle of (*a*) *Fagus sylvatica* and (*b*) *Abies alba* seedlings. Under continuous light, (*a*) passed twice through the whole annual growth cycle within 9 months, reaching a height of nearly 80 cm.; with a 10-hour day only juvenile leaves and an apical bud developed during the same period. By contrast (*b*) under continuous illumination developed juvenile leaves and an apical bud but did not start growing even in the following spring; when subjected to continuous darkness or a 10-hour day for not less than 42 days they showed in many cases a repetition of the growing cycle. [Cf. *For. Abstr.* 12 (No. 1942).]

1501. Żelawski, W. Wpływ fotoperiodyzmu na długość okresu wegetacji siewek modrzewia europejskiego. [**Photoperiodism and length of the growth period in seedlings of *Larix decidua*.**] *Sylwan* 98 (3), 1954 (200–3). [Pol.russ.]

Like other *Larix* species, *L. decidua* in laboratory conditions was found to grow more rapidly under continuous than under short-day illumination. The end of the growth period (here characterized by the stopping of growth and formation of the apical bud), is definitely delayed by the former and hastened by the latter. Under continuous light, Larch does not necessarily grow indefinitely, but may reveal a certain periodicity of growth, sometimes slackening to form a terminal bud, completely concealed among green leaves; but there is no typical rhythm. By applying a combination of short-day (2–3 weeks), and continuous illumination, the author succeeded in obtaining a full season's growth of Larch in about 2 months. Five such cycles were obtained during 11 months.

1502. Perry, T. O. **The genetics of the photoperiodic response in Poplar tree species.** *Abstr.* in *Genetics, Madison* 38, 1953 (681–2). (1953 Meeting, Genetics Society of America.) C.G.B.

Hybridization between ecotypes, and artificial alteration of the photoperiod show that the duration of terminal growth in Poplars is controlled by the interaction of the genotype and the photoperiod. In response to seasonal variations in temperature, Poplars have thus evolved a genetic system to control their duration of seasonal growth and initiation of frost resistance. This circumstance places severe restrictions on the possibility of success in transferring ecotypes from one environment to another.

181.3. Water, Soil and Root Relations (including Bacterial and Mycorrhizal Symbiosis)

See also Nos. 1360, 1362, 1397–1400, 1517, 1524, 1586, 1656, 1698, 1701–2, 1708, 1854, 2043, 2158, 2572.

1503. Salisbury, F. B. **Some chemical and biological investigations of materials derived from hydrothermally altered rock in Utah.** *Soil Sci.* 78 (4), 1954 (277–94). 22 refs.

Soils derived from rocks altered by ancient hot springs at Marysvale exclude the climatically adjusted desert flora and support almost exclusively *Pinus ponderosa*. The pH, P-fixing capacity and P relations, the H, Al and other ions, and the growth of experimental tomato plants, in these soils are discussed. It is concluded that the desert flora is excluded by low P and N. The Pine can exist on very low P and may get N from rain water or from mycorrhiza.

1504. **Tree growth on acid soil.** *Nature, Lond.* 174 (4436), 1954 (855–7).

Summarizes papers and discussion at the 1954 meeting of the British Association in Oxford, on the interactions between acid soils and forest trees. The following aspects were dealt with : The point of view of the forester, based on the experience of the U.K. Forestry Commission (*M. V. Laurie*); The development of podzols on heather moorland and the effects of Birch in converting heather mor to mild humus (*G. W. Dimbleby*); The formation of mor (*L. G. Romell*); The microbiology of acid soils with respect to soil-borne disease (*S. D. Garrett*); The physiology of mycorrhizae in relation to ecology (*J. L. Harley*); and The mineral nutrition of conifers (*L. Leyton*).

1505. Rennie, P. J. **The physical and chemical properties of forest soils.** *Rep. For. Res. For. Comm., Lond. 1952/53*, 1954 (107–10).

Investigations were made of the soils in an old Pine wood on land known to have been heathland in 1820, and under various broadleaved species in the same area, as well as under open *Calluna*. Porosity and aeration studies showed that prolonged forest cover had increased porosity very little compared with the *Calluna* moor. Increased aeration was due primarily to a reduced moisture content, not to improved structure. Prolonged coniferous growth had produced a marked change in the former *Calluna* raw humus; although of the same apparent thickness as raw humus under living *Calluna*, it possessed, in the water-free state, an apparent density of 0·2 instead of 0·4 g./ml.

In studies of soil P, both as 'total P' and 'easily soluble P', on podzolic moorland soil and on alluvial valley soil, it was found that, while the total amounts of P in each were similar, the distribution was very different, being fairly uniform down to

50 cm. in the valley soil but very variable in the podzol profile. The proportions of easily soluble P varied greatly in the different layers of the podzol profile.

1506. LEYTON, L. **The growth and mineral nutrition of Spruce and Pine in heathland plantations.** *Inst. Pap. imp. For. Inst., Oxf.* No. 31, 1954. pp. 109. 39 refs.

Experiments on young plantations of Sitka Spruce on certain upland heaths in Yorkshire suggest that the poor growth of the trees is to be attributed mainly to N deficiencies in the soil, aggravated by the presence of the heather vegetation. At least a temporary improvement in the N nutrition of the trees and in their subsequent growth may be brought about either directly by the application of a nitrogenous fertilizer or indirectly by the removal of the heather vegetation in screefing. Much of the stimulus to growth obtained by screefing is probably due to the release of nutrients, especially of N through the decomposition of the heather roots remaining in the soil, and the intensity of the stimulus therefore decreases with time. Despite alleged phosphate deficiencies in these soils, no evidence was obtained for a limiting influence of this nutrient on growth, and a response to the application of a phosphatic fertilizer was only obtained when the N supply to the trees had been improved. Similar experiments on another heathland plantation in Aberdeenshire, confirmed the beneficial influence of screefing on the N nutrition of the trees, but on this site Mn also appears to play an important rôle in so far as increases in the growth of the Spruce were accompanied by corresponding increases in the concentration of this nutrient in the needles. The application of a heather mulch, which had a very marked stimulating effect on the growth of these trees, was also characterized by significant increases in the concentrations of both N and Mn in the needles.

Parallel experiments on Corsican Pine and Scots Pine also growing in these plantations suggested that their growth was less affected than that of the Spruce by the low mineral nutrient availability in the soil. On the other hand, the removal of the heather vegetation appreciably stimulated the growth of the Corsican Pine, but though this was accompanied by an increased N concentration in the needles, there was no direct evidence that this was the factor primarily responsible for the response. In the case of the Scots Pine, screefing had an initially adverse effect on height growth, accompanied by a marked fall in the N status of the trees: this was attributed mainly to injuries and desiccation of the superficial roots of the trees brought about during the removal of the heather.

In all 3 species investigated, height growth from year to year was appreciably influenced by the amount of rainfall; in the case of the Spruce at least, it was found that the weather of the previous year was of particular importance in influencing current growth. This also appears to apply to other growth factors; in general, when growth conditions were improved by particular treatments, the response was observed first in the mean weight and colour of the current needles and then, only in the following year, in the height growth of the trees.

The establishment in certain cases, of significant relationships between the concentration of a particular nutrient in the tree needles and that in the foliage of the *Calluna* surrounding the trees, would suggest that under certain circumstances, the nutrient status of the *Calluna* itself might be used as a guide to the fertility of a particular heathland site for tree growth. The general applicability of this approach is discussed in relation to other factors affecting these relationships.

Detailed investigations into the nutrient status of the trees, as affected by the various treatments, suggest that the concentration of a particular nutrient in the needles cannot generally be used as an indication of deficiencies or otherwise in this nutrient since it is also affected by other factors besides availability in the soil. The relationship between tree growth and nutrient concentration in the needles is discussed in some length. *Author's summary.*

1507. DEMORTIER, G., RIGA, A., DARCHEVILLE, M., FOUARGE, J., and SACRÉ, E. Le développement des boutures de *Populus robusta* Schneid. en fonction du pH et du rapport Ca/Mg. [**The growth of Poplar cuttings as a function of pH and Ca/Mg ratio.**] *Bull. Inst. agron. Gembloux* 22 (1/2), 1954 (10–7). [F.f.] E.M.B.

Poplar cuttings were grown in 3 series of soils with pH adjusted to 4·5, 7·0 and 8·0 by additions of $CaCO_3$. In each series the Ca/Mg ratio was adjusted by introducing appropriate quantities of (1) $CaSO_4$ and $MgSO_4$ or (2) $CaCl_2$ and $MgCl_2$ to give 1, $\frac{1}{5}$, $\frac{1}{10}$, $\frac{1}{20}$, and nil proportions of Mg based on Ca. Development of the cuttings as measured by dry weight of one year's growth was best at a pH of 7 and ca. $\frac{1}{10}$ of Mg based on Ca.

1508. ŠÁLY, R. Agát a pôda. [***Robinia pseudoacacia* and the soil.**] *Les, Bratislava* 1 (7/8), 1954 (9–18). [Slovak.]

Results of comparative analyses of soil samples from under *R. pseudoacacia* stands and adjacent stands of other species (Oak, Beech, Birch, Pine) in the Lučenec region (with 1260 ha. of Robinia stands 1–35 years old), could not be properly evaluated because most of the profiles tested were not comparable. It was found, however, that in the stands examined the physical properties of soil under Robinia are at all events not worse than under other species. The Robinia stands here are mostly dense, and the soil is protected from direct insolation and desiccation. Soil-moisture content was always higher under Robinia than under Oak or Beech. No physical degradation of the soil was found even under open Robinia stands with grass cover. Robinia is said to be compatible in mixtures with Ash, Hornbeam and Oak (*Quercus robur* and *Q. cerris*).

1509. MÉTRO, A., and BEAUCORPS, DE. Voyage d'étude des *Eucalyptus* au Maroc (22–30 Oct. 1954): L'influence des peuplements d'*Eucalyptus* sur l'évolution des sols sablonneux du Rharb. [**Eucalypt study tour in Morocco (22–30 Oct. 1954): The influence of Eucalypts on the evolution of the sandy**

soils of the Rharb.] [*Docum.*] *FAO Jt. Subcomm. Medit. For. Probl.* No. *FAO/SCM/EU*/4, 1954. pp. 13. 3 refs. [F.]

The amelioration of these soils caused by Eucalypt plantations is entirely dependent on the permanence of forest cover. Intensive exploitation of the plantations would, in particular, soon exhaust the available K in the soil.

1510. HOPKINS, J. C. **A centrifuging method for root sterilization.** *Nature, Lond.* 174 (4439), 1954 (1016). [R. Botanic Gardens, Edinburgh.]

Describes an apparatus developed for use in isolating mycorrhizal fungi present in root tissues, the external surfaces of which must be sterilized without damaging the hyphae within.

1511. MELIN, E., and NILSSON, H. **Transport of labelled phosphorus to Pine seedlings through the mycelium of *Cortinarius glaucopus* (Schaeff. ex Fr.) Fr.** *Svensk bot. Tidskr.* 48 (2), 1954 (555–8). 6 refs. [E.] O.B.D.

[Cf. *For. Abstr.* 12 (No. 59).] Experiments with *C. glaucopus* in the laboratory showed that P^{32} can be transported by the mycelia to root cells of *Pinus sylvestris* and is translocated thence to the aerial parts of the plant.

1512. BRIERLEY, J. K.; WAID, J. S.; WILSON, J. M. **Beech mycorrhiza.** *Nature, Lond.* 174 (4432), 1954 (684–6).

Summarizes 3 papers read at the Oxford meeting of the British Association and based on research carried out at Oxford [cf. *For. Abstr.* 15 (No. 3241)] on uptake of P and K by mycorrhizal roots, and the fungus flora of Beech roots.

1513. MIHOVIČ, A. I. Izučenie mikorizy duba v uslovijah lesostepi levoberežnoĭ Ukrainy. [**A study of the mycorrhizal relations of Oak in the forest-steppe zone of the Ukraine east of the Dnieper.**] *Lesn. Hoz.* 5 (2), 1952 (35–40). [Russ.]

Gives some results from investigations made by the silvicultural section of the Kharkov Agricultural Institute in the growing seasons of 1949 and 1950. On mature trees, the development of mycorrhiza begins when the root tips become infected by the hyphae (in this region from late June to early July), which later penetrate the intercellular spaces of the cortical parenchyma and envelope the absorbing root tips with a fungus mantle (ectotrophic mycorrhiza). With the advent of cold weather the absorbing roots become lignified and the external fungus mantle loosens and dries up. At this stage endotrophic mycorrhiza is formed in the parenchyma. cells. Further growth and lignification are accompanied by disappearance of both external and internal hyphae. The course of mycorrhiza development on naturally regenerated seedlings resembles that on roots of mature trees, but 1-year plants on planting sites and in nurseries become infected somewhat later. A special experiment was made with autumn- and spring-collected acorns sown in spring 1950: (1) on open, grey forest soil-(2) on grey forest soil under canopy; (3) on cherno; zem steppe soil; (4) in boxes filled with sterilized grey forest soil (autoclaved at 2–3 atm. pressure and 121–134° C). Acorns sterilized with 95% alcohol and 5% $KMnO_4$ solution were sown as controls. Root systems were examined in October 1950 for mycorrhiza development. Of the seedlings from spring-collected acorns sown on soils (1)–(3) 79–83%, and of those sown on (4) 74% had mycorrhiza; corresponding figures for autumn-collected acorns were 84–95% and 84%, and for the controls, 72–77% and 31%. Results for all variants are tabulated. It is concluded that, even in the autumn, the acorns are sufficiently infected with mycorrhizal fungi and that the unsterilized soils carry sufficient inoculum also. To compare the effect of various pretreatments on the intensity of mycorrhizal development, acorns treated as follows were sown in spring 1950, on various soils: (*A*) pregerminated in fresh horse manure; (*B*) pregerminated in forest litter; (*C*) sown with an addition of mycorrhizal soil; (*D*) sown without artificial infection; and (*E*) sterilized acorns, as controls. In lots (*A*) and (*B*), one-half of the acorns were previously sterilized. Microscopic examination in late October, 1950, showed little variation in the degree of mycorrhizal development (tabulated), regardless of pretreatment and soil, but the most intensive development of mycorrhiza was found in seedlings from (*A*) and (*B*). Further sowings were made, in sterilized soil, of acorns: (*a*) unsterilized, pregerminated in sterilized manure; (*b*) sterilized, pregerminated in unsterilized manure and (*c*) sterilized, pregerminated in sterilized manure (the soil was sterilized as in the previous case, the acorns with 95% alcohol, and the manure in a 'Koch boiler' at 98·5° C. for 1 hour). An examination at the end of October 1950 showed that the treatments gave the following %s of mycorrhizal seedlings—(*a*) 100, (*b*) 83, (*c*) 30. It is concluded that the (sterilized) manure stimulated the development of mycorrhizal agencies already present on the unsterilized acorns, and the unsterilized manure infected the sterilized acorns, indicating the presence of mycorrhizal agencies in the manure itself. The development of mycorrhizal seedlings from (*c*), as also the other experiment with 'sterilized' acorns, indicate fairly high resistance of the mycorrhizal agencies to the sterilization treatment. The influence of various soils on mycorrhiza development was tested by sowing acorns from one single lot on (i) washed quartz sand, (ii) the same sand with an admixture of sterilized horse manure (72 kg. sand, 2 kg. manure) and (iii) sterilized grey forest soil. Examination of the seedling roots showed a definite relationship between the organic content of the soil and the development of mycorrhiza (% of mycorrhizal seedlings on soil (i) 40, (ii) 57, (iii) 84%). Finally, it is concluded that under the conditions of the forest-steppe zone in this region, there is no need for artificial infection of acorns, since sufficient inoculum exists on the acorns themselves and in the soil.

1514. ELAGIN, I. N., and MIN, V. N. Kornevye sistemy duba na temnoseryh počvah i soloncah. [**The root systems of Oak on dark-grey soils and on solonets.**] *Lesn. Hoz.* 5 (4), 1952 (13–5). [Russ.]

Summarizes an investigation of 3 Oaks, (1) on dark-grey, and (2) and (3) on solonets soils, in the Tellerman Forest. The root systems were studied

by cutting a trench 1 m. wide and 4 m. long, extending 2·5 m. to one side and 1·5 m. to the other side of the stem, and by taking out 50 × 50 cm. soil monoliths (to a depth depending on root penetration), 35–40 cm. apart [cf. *For. Abstr.* 12 (No. 1777)]. Results are given in tables and drawings showing root distribution. Trees 1 and 3 were 55 years, and tree 2, 70 years old. The dimensions of trees 1, 2 and 3 were respectively: height 21·4, 13·4, 6·9 m.; d.b.h. 32, 15·5, 6·6 cm.; crown diameter 9·6, 3·9, 1·2 m.; and the corresponding estimated total air-dry weights of aerial parts, 807, 140 and 20 kg. The chief difference in the distribution of fine roots lay in their restriction in the solonets soil to the topmost soil horizons, owing to inability to penetrate the horizon of sulphate accumulation, whereas in the dark-grey soil fine roots showed two zones of maximum development—in the topmost 10 cm. and again at 90–100 cm. immediately above the underlying carbonate-rich loess clay-loam. The total length of roots was greater in the solonets soils, and the estimated ratios of total air-dry weight of aerial parts to total weight of roots within a radius of 2·25 m. from the stem were 1·6 : 1 for tree 2 [not given for tree 3] and 9·3 : 1 for tree 1, indicating that Oak on the solonets soil needs about 6 times the weight of roots in the dark-grey soil to support an equivalent stem and crown. The author concludes that, contrary to general opinion, Oak does not need, for some sort of growth, a top soil layer 1 m. deep from which salt has been leached out, and that a desalinified layer extending to 2 m. depth is sufficient for Oak plantations as production forest.

1515. JUNI, D. A. **Preliminary study on root characteristics of Narra (*Pterocarpus indicus* Willd.) and Supa (*Sindora supa* Merr.) seedlings in clay loam soil.** *Philipp. J. For.* 9 (1/4), 1953 (1954), (25–41 + 2 plates). 6 refs.

Seedlings of both species developed prominent tap roots. Average length of tap root in *P. indicus* was less than length of stem, in *S. supa* it was about equal to stem length. Root weight/stem weight ratio in seedlings 1–120 days old was 0·30/0·66 in *P. indicus* and 0·38/0·64 in *S. supa*. Root growth in both species was more rapid than shoot growth at first, but gradually decreased with age. *From author's summary.*

1516. KADAMBI, K. **Instances of the fusion of the tissues of different trees.** *Indian For.* 80 (11), 1954 (726 + plate).

Describes (1) a case of fusion of surface roots of *Santalum album* and *Eugenia jambolana*, which resulted in the fruits of the latter having a distinct flavour and scent of sandalwood; (2) a fusion at about mid-height of a *Ficus infectoria* and a *Vateria indica*, which resulted in the wood of the former having the characteristic aromatic smell of *Vateria*, and the latter exuding a thin milky latex like that of *Ficus*.

181.4. Reaction to Biotic Influences (Competition etc.) and Fire

See also Nos. 1521, 1545, 1587, 1869–70.

1517. RUBIN, S. S., POPOVA, N. E., DANILEVSKIĬ, A. F., and KORZUNECKAJA, N. K. Vlijanie travjanistoĭ rastiteljnosti i ee kornevyh vydeleniĭ na rost drevesnyh rasteniĭ. **[The influence of grass vegetation and of its root exudates on the growth of woody plants.]** *Lesn. Hoz.* 5 (1), 1952 (48–51). [Russ.]

Describes some laboratory experiments on the effect of grasses and agricultural crops, and of their root exudates, on the growth of woody plants. One Oak seedling and two Apple wildings were planted in each of a series of vessels filled with chernozem soil; in one series (controls) the soil was kept free of weeds and watered with pond water (local tap water being too limy); in another sowings were made of (*a*) lucerne and ryegrass, (*b*) *Agropyrum* sp., (*c*) barley, all watered with pond water; and in a third, drainage water from vessels specially sown with (*a*), (*b*) and (*c*) was used for watering. Measurements of diameter and height and the number and mean air-dry weight of the leaves, showed that although drainage water from the grasses had an inhibiting effect upon growth of the woody species, this effect was still stronger when the grasses were grown along with the woody species, in the same vessels.

181.5. Reproductive Behaviour

See also Nos. 1417, 1419–20, 1436, 1533, 1589 *et seq.*, 2073.

1518. DUNCAN, D. P. **A study of some of the factors affecting the natural regeneration of Tamarack (*Larix laricina*) in Minnesota.** *Ecology* 35 (4), 1954 (498–521). 172 refs.

A study was made during 3 summers to determine the more important factors affecting the reproduction of *L. laricina*. Good seed crops, which occur at intervals of about 4 years, in greatest abundance on 50- to 150-year-old trees with well developed crowns, produced 1–2 million filled seeds/acre in stands of medium stocking. Most of the good seeds were disseminated during Sept.–Oct., and satisfactory regeneration was seldom obtained at a greater distance from the source than two tree-heights. Much seed was destroyed on the tree by lepidopterous larvae and on the ground by rodents. Field germination is low, averaging only 4–5%. Factors unfavourable to germination are spring floods and deficiency of moisture in the germinating medium. Maximum field germination occurred under a fine moss cover. Relative illumination and soil pH appeared to have no significant effect. Only ca. 3½% of seedlings survived to the end of the third summer. Damping off was the principal cause of mortality during the first 5–6 weeks; in the immediately following juvenile stage, light deficiency, drought, and drowning were major causes of mortality. No seedlings were found to survive beyond the 6th year in well stocked stands. The biological requirements of the species for obtaining satisfactory regeneration appear to be plenty of light, and relatively constant water level, and an abundant source of seed.

1519. SQUILLACE, A. E. **Engelmann Spruce seed dispersal into a clear-cut area.** *Res. Note Intermt. For. Range Exp. Sta.* No. 11, 1954. pp. 4.

Results, shown on a graph, from the first 5 years of a study in Flathead National Forest, suggest that

clear-felled areas more than 20 chains wide may be too large to allow prompt and adequate restocking.

1520. Fraser, J. W. **A study of seed-bed conditions in relation to germination of Jack Pine and Red Pine seed.** *Rep. For. Res. Proj. For. Br. Can. 1953/54*, 1954 (43).

A study was made of the effect on germination of *Pinus banksiana* and *P. resinosa* seed of duration of seedbed exposure to direct sunlight as controlled by height and spacing of parallel N.–S. walls. Seed of both species, when exposed for 4 hours daily, germinated as well as they did in full shade, but germination was adversely affected by daily exposures in excess of 4 hours. The variation was attributed to unfavourable variations in soil moisture and temperature associated with lengthened exposures, rather than to the increase in light as such.

1521. Hiljmi, G. F. Vlijanie tolščiny lesnoĭ podstilki na čislennostj vshodov sosny i eli i na konkurentnye otnošenija meždu nimi. **[Influence of litter thickness on the number of seedlings of Scots Pine and Norway Spruce and on their relationships in competition with each other.]** *Dokl. Akad. Nauk SSSR* 95 (2), 1954 (395–8). 4 refs. [Russ.] A.P.B.

Assuming for simplicity that litter is homogeneous in structure, the author arrives by purely mathematical means at an expression for the number of germinated seeds per unit area, whose roots successfully reach some depth x. If x = litter thickness (h), the formula reads: $\nu = \nu_o e^{-kh}$ where ν = no. of such successful seedlings and ν_o = no. of seeds germinated, per unit area, [e is the base of natural logarithms], and k is a constant. This formula is tested on some data obtained by A. A. Molčanov (*Agrobiologija* 1946 (104)) for Pine and Spruce, results being tabulated to show the fairly close correspondence between actual and calculated values of ν. The value of k for Pine was about twice that for Spruce, and this is in part a measure of the greater sensitivity of Pine seedlings to litter thickness, and hence also of its competitive inferiority to Spruce in this respect. Local variation in the litter itself would also cause variation of k.

1522. Mergen, F., and Hoekstra, P. E. **Germination differences in Slash Pine from various sources.** *Sth. Lumberm.* 182 (2364), 1954 (62 . . . 66). [Southeastern Forest Experiment Station.]

Seed obtained in 1953 from 16 points within the principal commercial part of the natural range of *Pinus elliottii* was sown in early March 1954 in the Olustee Experimental Forest Nursery. Germination of all seed lots was rapid and most of the seed had germinated in 3 weeks. The highest germination was 97·5% (from Dooly County, Georgia) and the lowest 82·7% (from Calhoun County, Florida). Differences were significant.

1523. Bormann, F. H. **Ecological implications of size and weight changes in *Pinus taeda* L. seedlings during the first growing season.** *Abstr.* in *Bull. ecol. Soc. Amer.* 35 (3), 1954 (59–60). A.P.B.

Growth measurements were made during the first growing season on sun- and shade-grown seedlings. Shoot/root ratios in both sets were about 7 : 1 for the first ⅔ of the growing season, but 2 : 1 at its end. This helps to explain the relatively poor drought-resistance of very young seedlings. Juvenile needles composed the entire leaf weight for ½ of the growing season, but at its end 52% and 71% of the functional leaf weight of shade- and sun-grown seedlings respectively was in secondary fascicled needles. This may be of ecological importance since initial measurements suggest that juvenile needles are shade-tolerant, while secondary fascicled needles are not.

1524. Tazaki, T. **[An ecological study of the Pine windbreak area near the sea coast. V. The fate of seedlings of Japanese Black Pine (*Pinus thunbergii*). (2).]** *Bulletin, Physiographical Science Research Institute, Tokyo* No. 7, 1951 (20–5). [Jap.e.] From *abstr.* in *Jap. Sci. Rev.* (*biol. Sci*) No. 2, 1953 (108–9). [E.] I.I.E.

Experimental studies showed that in July the water content of shoots in normal condition was about 350%, but seedlings dried out quickly and were killed a few days after the available soil water had been used up, although the stomata closed and transpiration decreased. The critical water content for the shoots measured by a method devised by the author [not described] was 110%. Similar results were obtained in August, but normal and critical water contents were 250 and 85%. Field studies gave similar results. Natural regeneration may be impossible in windbreaks along the coast, where rainfall in summer is irregular despite high monthly averages.

1525. Olson, J. S. **Germination and survival of Eastern Hemlock seedlings in Connecticut seedbeds.** *Abstr.* in *Bull. ecol. Soc. Amer.* 35 (3), 1954 (60). A.P.B.

Seedlings of *Tsuga canadensis* become established locally on rotting wood and more widely on thin litter or moss over mull-type humus, especially where organic and inorganic materials are mixed with seed by rain splash or earthworm activity. Thick conifer, litter-mor type, humus profiles may dry up rapidly before seedling roots reach moister mineral soil, and may be heated rapidly to lethal temperatures during even brief exposure to sunlight. Many mineral soil seedbeds have more favourable temperature and moisture conditions, but physical disturbance such as rainwash and frost heaving may uproot all but the most vigorous seedlings. Heavy hardwood litter may directly smother slowly growing seedlings. Organic disturbances include infection by *Rhizoctonia* sp.

1526. Sutton, R. C. **Some influences of seedbed on germination, growth, and survival of Western Hemlock [*Tsuga heterophylla*].** *Res. Note U.B.C. For. Club* No. 10, 1954. pp. 4.

Seed was germinated on 5 media (*a*) rotten wood, (*b*) Hemlock litter, (*c*) humus, (*d*) mineral soil, and (*e*) vermiculite. Height growth on (*b*) and (*c*) was 6 times as great as that on (*a*), (*d*) or (*e*). There was no significant difference in amount and rate of germination on the 5 media, which differed considerably in pH, and it is concluded that pH had no direct effect on germination and survival.

1527. Black, M., and Wareing, P. F. **Photoperiodic control of germination in seed of Birch (*Betula pubescens* Ehrh.).** *Nature, Lond.* 174 (4432), 1954 (705–6). 4 refs.

Preliminary tests showed that unstratified (i.e. unchilled) Birch seeds will not germinate on moist filter paper in complete darkness at room temperature, but will do so if exposed to light. Experiments were then carried out to determine the effect on germination of exposing the seeds to various photoperiods. It was found that germination is markedly affected by the conditions of day length, but that this response is profoundly modified by the prevailing temperature. Seed soaked and stored in the dark at 5° C. for 6 weeks germinated rapidly in darkness on transfer to a temperature of 15° C. Chilled Birch seed has apparently, therefore, no light requirement.

181.6. Life Form, Habit. Post-Seedling Development and Form

See also Nos. 1450, 2214.

1528. Poljakova, N. F. Sootnošenie meždu massoĭ listvy, prirostom drevesiny i transpiracieĭ. **[Correlation of leaf weight, wood increment and transpiration [in Oak].]** *Dokl. Akad. Nauk SSSR* 96 (6), 1954 (1261–3). 6 refs. [Russ.] A.P.B.

Tabulates and illustrates graphically the results of measurements of fresh leaf weight (l.wt.) and c.a.i. of 37 Oak sample trees from typical Oak/mixed-hardwood stands, 25–200 years old, of the forest-steppe zone in the Tellerman forest, Voronezh. L.wt./tree increased with increase of d.b.h., but for any given d.b.h. it decreased with increasing age of tree. Maximum diameter c.a.i. corresponded to max. l.wt./tree, and a linear correlation was found between the latter and volume c.a.i. It should therefore be possible to compile tables for estimating l.wt. from these factors. A table is given of annual wood production (i.e. volume c.a.i.) per 1 kg. foliage, as related to age and d.b.h. A linear correlation between transpiration and volume c.a.i. is also reported [without details] and shown graphically, indicating the possibility of regulating the water regime of such stands by silvicultural control of increment.

1529. Vyskot, M. Vliv stísnění korun na zavlčení u dubu. **[Effect of crown suppression on the formation of epicormics in *Quercus robur*.]** *Práce výzkum. Úst. lesn. ČSR* No. 4, 1954 (277–318 + 1 tbl.). 43 refs. [Cz.cz.russ.g.]

Observations were made on 2 experimental plots, totalling 2·25 ha., established in 1950 in the floodland forest region near Horní Les (Moravia), with ca. 1000 and 1500 trees, respectively. Some clear-boled trees were deprived of ⅓–½ of the crown, while on those with epicormics 2–3 roots were cut off near the butt. Changes up to late 1952 were insignificant, and it is proposed to make the first measurements in 1953. The preparatory work is described: it covered studies of the history of the sites; climate, soil and forest types; diseases and insect pests. Statistical analysis of preliminary measurements from these plots and of measurements from other stands in a hilly region showed that in both regions crown suppression was the most important factor associated with the formation of epicormics.

1530. **[Relation between forking and site quality.]** *Rep. For. Timb. Bur. Aust. 1953*, 1954. (23).

Data collected on the incidence of forked trees have confirmed a relationship between forking and site quality. This can be tentatively represented by the equation $Y = 49 - 6{\cdot}7x$, where Y is the % of forked trees and x is the numerical index of site qualities I to VII.

1531. Farnsworth, C. E. **Observations of terminal elongation of certain tree species in the Western Adirondacks.** *Abstr.* in *Bull. ecol. Soc. Amer.* 35 (3), 1954 (60). A.P.B.

Growth patterns are very similar for the same species growing on similar sites during the same year, but differ for the same species in different years, probably owing to differences in air temperatures. Each species reacts to site factors in a characteristic manner, unlike that of any other species.

181.7. Duration, Longevity, Stature; Records of Exceptional Age or Size. Effects of Age on Behaviour

1532. Mitchell, A. F. **Two old Larches at Epsom.** *Quart. J. For.* 48 (4), 1954 (293–6 + 2 photos). 14 refs.

Notes on two European Larches recently felled on the Durdans estate. Study of cross-sections of the butts showed them to be ca. 235 and 240 years old respectively. Their dimensions were: g.b.h. 9 ft. 7 in., 11 ft. 4 in., and height 120 ft., 117 ft. The first tree was sound to the core and the second sound except for the central 1½ in. of the stump. Grafting material from both is being used for breeding at Alice Holt.

181.8. Phenology

See also Nos. 1500–2.

1533. Yanagisawa, T. **[Some phenological observations on forest trees at various altitudes on Mt. Muine in Hokkaido.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 70, 1954 (71–92). 18 refs. [Jap.e.]

Investigations were made in 1943, for a number of species at various altitudes, on flushing, moisture content, specific gravity of tissue powder (Koketsu method), ash content of new leaves in spring, and ripening of cones (*Abies sachalinensis* and *Picea jezoensis*) in autumn. Climatic data were also studied. At 300 m. species could be divided into 3 groups, early (e.g. *Sorbus aucuparia*, *Betula latifolia*), medium (e.g. *Ulmus japonica*, *B. maximowicziana*) and late flushing (e.g. *Picea jezoensis*, *Abies sachalinensis*, *Quercus crispula* and *Fraxinus mandshurica*). The first group opened their buds when mean air temperature for the previous 10 days reached 6–8° C., the second 8–11° and the third 11–13°. The date of flushing grew later with increasing altitude, at a rate of 2–3 days/100 m. for many species. Duration of leafing increases with increasing altitude in e.g. *P. jezoensis*, *A. sachalinensis*, *S. aucuparia*, but decreases, in e.g. *Betula ermanii*, *Alnus tinctoria*, and *Acer pictum*. Leaf moisture-content increased from

the start of flushing until the period of full leaf and then decreased. The sp. gr. of tissue powder of new leaves decreased as leafing progressed and could serve as an indicator of the stage of leafing. The ash content increased as leafing progressed. Moisture content of cones was fairly constant through July, Aug. and early Sept. but decreased rapidly from the end of Sept. It decreased gradually as the cones ripened, and the seeds were ready for release when it fell below 25%. Seeds from the lower stations became germinable earlier than those from higher ones, and *P. jezoensis* before *A. sachalinensis*. [Results are given in tables with English legends.] *From author's summary.*

182. *Synecology, Plant Sociology: General, Principles and Methods*

182.1. Palaeoecology. History of Vegetation

See also Nos. 1594, 2210–1.

1534. PJAVČENKO, N. I. Izmenenie sostava lesov na juge Valdaĭskoĭ vozvyšennosti v Golocene. [**Change in forest composition during the Holocene in the south of the Valdai Hills.**] *Dokl. Akad. Nauk SSSR* 90 (6), 1953 (1143–6). 3 refs. [Russ.] A.P.B.

Pollen analyses of two bogs reveal the following postglacial succession: (1) Birch, (2) lower Spruce phase (probably islands of Spruce in tundra), (3) Pine/Birch, (4) deciduous forests (Elm, Lime, Oak, Hazel and, later, Alder), (5) upper Spruce phase. Spruce is still the dominant species of the region, as it seems to have been for the past 2·5–3 thousand years. [Cf. *For. Abstr.* 16 (No. 257).]

1535. POTZGER, J. E., and COURTEMANCHE, A. **Bog and lake studies on the Laurentian Shield in Mont Tremblant Park, Quebec.** *Canad. J. Bot.* 32 (5), 1954 (549–60). 16 refs. O.R.S.

Discusses the development of forest vegetation to the present day as shown by samples from 5 bogs and 1 small lake.

1536. HOLLOWAY, J. T. **Forests and climates in the South Island of New Zealand.** *Tech. Pap. N.Z. For. Serv.* No. 3, 1954. pp. [82] + 8 photos. 41 refs. (*Repr.* from *Transactions of the Royal Society of New Zealand* 82 (2), 1954 (329–410).)

In Part I of this report on the indigenous forests of the South Island of New Zealand, an analysis is made of the many striking peculiarities of forest species and forest-type distribution and behaviour evident in the forests of Western Southland. These peculiarities are shown to be explicable in terms of an hypothesis stating, briefly, that the forests, as a whole, are in an unstable condition consequent on comparatively recent changes in regional climates; and that, as a result, an active re-distribution of species is in progress with resultant development of a wide range of new, though by no means stable, forest types.

In Part II of the report, the forests of eastern and inland regions of the South Island, forests of regions now generally possessing semi-arid grassland climates, are examined and are shown to demand formulation of the same hypothesis for adequate explanation of their distribution and condition; and this hypothesis is shown not to be in conflict with evidence derived through studies of the soils or through study of Polynesian traditions.

In Part III, the salient features of forest-type distribution and behaviour for certain other South Island forest regions are outlined in demonstration of the fact that the forests of these regions are also comprehensible in terms of the hypothesis.

In Part IV, it is shown that the phenomena discussed in preceding sections of the reports are by no mean peculiar to New Zealand forests but that, nevertheless, there are valid reasons for the prominence of these features in New Zealand forests in comparison with the forests of other countries. And, in Part IV, also, implications inherent in the hypothesis are briefly discussed. *Author's summary.*

182.2. Succession, Alternation and Periodicity in Vegetation

See also Nos. 1536, 1557, 1763, 1869.

1537. MCKELVEY, P. J. **Forest colonisation after recent volcanicity at West Taupo.** *N.Z. J. For.* 6 (5), 1953 [1954] (435–48 + map). 4 refs.

A general descriptive account is given of West Taupo forest associations. Their zonal distribution is ascribed to colonization of areas devastated by recent volcanicity. Anomalies are discussed and it is pointed out that they can be explained only in terms of J. T. Holloway's postulate of regional climatic change affecting forest stability [cf. preceding abstract.] *Author's summary.*

1538. ALEXANDER, T. R. **Plant succession on Key Largo, Florida, involving *Pinus caribaea* and *Quercus virginiana*.** *Quarterly Journal of the Florida Academy of Sciences, Gainesville* 16 (3), 1953 (133–8). 5 refs. L.S.

A study, in which a line transect was used, gave further evidence that *P. caribaea* has grown on the island and showed that *Q. virginiana* is still found there. Both species appear to play much the same rôle as on the mainland in succession towards the climax subtropical hammock type of vegetation.

1539. HEINSELMAN, M. L. **The extent of natural conversion to other species in the Lake States Aspen-Birch type.** *J. For.* 52 (10), 1954 (737–8).

Of the existing 19·5 million acres of Aspen/Birch, present trends indicate that, by 1990, 2·1 will have reverted to northern hardwoods, 1·43 to Spruce/Fir, 0·75 to mixed types and 0·08 to Pine. Low-value types will cover > 1·0 million acres, 2·6 are already partly converted to other types and 9·5 do not give much promise of conversion in the foreseeable future.

1540. BECKWITH, S. L. **Ecological succession on abandoned farm lands and its relationship to wildlife management.** *Ecol. Monogr.* 24 (4), 1954 (349–76). 55 refs.

A detailed study of the first 25 years of succession in bird, mammal and plant communities, in reversion towards the climax, *Acer saccharum/Tilia americana* or *Fagus grandifolia*, from farm land in Washtenaw County, Mich., where forest cover was 98% in 1830 and 10 in 1930. Graphs and tables show the changes over the years in plants (on 2 soil types) and

small mammals; the use of the succession phases by birds and some common mammals; and the seasonal use of each phase by the ring-necked pheasant and cottontail rabbit.

1541. KRISHNASWAMY, V. S., and PURI, G. S. **Results of an experiment to study the succession of ground flora species under forest plantations raised on old agricultural land in the New Forest, Dehra Dun, India.** *Indian For.* 80 (9; 10), 1954 (522–30; 631–48). 8 refs.

Small quadrats were laid down in plantations of *Gmelina arborea*, *Tectona grandis*, *Pinus longifolia*, and *Dalbergia latifolia*, and frequencies of almost all ground vegetation were recorded over the period 1928–49. The data are examined, and faults in the lay-out of the plots discussed.

182.4. Layer Communities

See also Nos. 1541, 1564, 1570–1, 1593.

1542. KORNEV, V. P. Izmenenie podleska pri roste sosnovyh nasaždenii. **[Changes occurring in the underwood of Scots Pine stands in the course of a rotation.]** *Lesn. Hoz.* 5 (2), 1952 (65–70). [Russ.]

Changes in density, height and composition of the underwood in several types of Pine forests have been studied in the Bryansk Experimental Leskhoz. In the *Pinetum vacciniosum* the underwood consists of *Sorbus aucuparia* with some *Rhamnus frangula* and has a density of 9000 shoots/ha. with a mean height of 1·63 m., at the end of the rotation; after final fellings this number is reduced to 6300, with a mean height of 0·86 m. During closing of the canopy, when light, moisture and mineral nutrients are fully used by the Pine, the underwood disappears almost completely (at 20–25 years only 200 shoots/ha. of *Sorbus* remain, with a mean height of 1·4 m.) while the *Rhamnus* drops out altogether. At the end of the pole stage (40–50 years) the dormant underwood stumps start to coppice and underwood reappears (density 1300 shoots/ha., mean height 0·24 m.). In the *Pinetum tiliosum* the underwood is denser (30,200 shoots/ha., mean height 1·08 m.), consisting of 60% Lime, with Hazel and *Euonymus*, neither *Sorbus* nor *Rhamnus* being present. After final fellings the underwood coppices vigorously (31,200 shoots/ha., mean height 3·29 m.) and if the main species does not succeed in regenerating and establishing itself in a few years, it is suppressed by the Lime and Hazel. When the Pine is in the pole stage (20–25 years) the underwood consists of spindly growth with sparse foliage (62,300 shoots/ha., mean height 1·69 m.), *Euonymus* being second in frequency to Lime. As the Pine canopy becomes less dense (30–35 years) the number of shoots in the underwood drops to 23,600/ha. with a mean height of 1·05 m., and *Sorbus* and *Rhamnus* appear. As the main crop thins out the underwood increases (27,200 shoots/ha. at 50 years) and is again very dense when the Pine reaches maturity. The underwood thus remains well developed through the whole rotation. In the *Pinetum polytrichosum* the underwood shows no marked changes during the rotation; its composition is similar to that of the *P. vacciniosum*, but includes *Salix cinerea*, and *R. frangula* is the chief component. Under mature Pine the density of the underwood is here 20,000 shoots/ha., and although it shows a marked decrease in height in the pole stage, it never disappears; this is attributed to the sufficiency of moisture and the availability of mineral nutrients from the groundwater.

In the *Pinetum oxalidosum* and *P. hylocomiosum* the underwood disappears in the thicket and pole stages. In *P. corylosum* and *P. quercetosum* the underwood density in the pole stage decreases to moderate; as the crop approaches maturity, some of the strongest shoots of the underwood grow up into the second storey. It is a peculiarity of the *P. myrtillosum* of this district that at 10–15 years a dense underwood of Spruce appears which reaches the second storey only as the Pine approaches maturity. The practical importance of the study lies in the indications which it has provided as to the best time to introduce an artificial underwood.

1543. HALE, M. E. **An application of interspecific association to corticolous cryptogamic communities.** *Abstr.* in *Bull. ecol. Soc. Amer.* 35 (3), 1954 (66). A.P.B.

A survey of the cryptogams on several thousand trees in southern Wisconsin.

182.5. Synecological Measurements and Methods

See also Nos. 1541, 1563.

1544. WOODIN, H. E., and LINDSEY, A. A. **Juniper-Pinyon east of the continental divide, as analysed by the line-strip method.** *Ecology* 35 (4), 1954 (473–89). 20 refs.

A plant-sociological study of the 'Pinyon-Juniper association' was made in the eastern foothills of the Rockies from Sept. 1951 to Aug. 1953. One of the objects was to develop a sampling method sufficiently rapid for a broad reconnaissance study of a large region without sacrificing accuracy. Another important need was to obtain reliable data on cover, because of its relation to erosion. These needs were met by combining into one sampling unit the line-interception principle plus a very long narrow quadrat ('line-strip' method). The application of this sampling method is discussed in detail. The line-strip consists of a surveyed line placed at random within a stand and bisecting (longitudinally) an unsurveyed strip, the length of both, and width of the strip, depending on the type of vegetation. Cover data are gathered from the 'line', density, abundance and frequency from the 'strip'. The boundaries of the strip are estimated except when trunks are so near the boundary as to be in doubt. In the Pinyon/Juniper association an 800-ft. line was used, bisecting a strip 20 ft. wide. Although other workers have used only straight lines, a bent form was adopted for Pinyon/Juniper vegetation, because straight lines placed at random might fall largely within the linear influence of gulleys, ridges, crevices etc. The 800-ft. line was bent at mid-point so that it consisted of two 400-ft. halves forming a right angle with one another. The word 'elb' has been coined to describe this unit. The value of the method is due in part to the fact that the central line provides a more accurate and easier method of determining cover than the quadrat or belt transect. The % of

the total line length intercepted by a species at a station gives a reliable estimate of the % cover per acre contributed by that species at the station.

The data derived from the study are tabulated and discussed, and 3 subdivisions of the type are proposed: (1) a southern, in which occur *Juniperus pachyphloea*, *Pinus cembroides* and *J. texensis*; (2) a central, supporting primarily *J. monosperma* and *P. edulis*; and (3) a northern, consisting largely of *P. edulis* and *J. scopulorum*.

187. *Vegetation Types*

See also Nos. 1356, 1358–9, 1503, 1536–7, 1540, 1542, 1544, 1596, 1869–70, 1877.

1545. Cloudsley-Thompson, J. L. [Editor]. **Biology of deserts: the proceedings of a symposium on the biology of hot and cold deserts organized by the Institute of Biology.** Institute of Biology, London. 1954. pp. iv + 224. Price 14*s*.

Includes the following papers: Forests, aridity, and deserts (*E. P. Stebbing*); The influence of climatic factors on the reaction of desert shrubs to grazing by sheep (*H. C. Trumble* and *K. Woodroffe*); Biological research and the productive transformation of steppe and desert in the Soviet Union (*S. M. Manton*).

1546. Hejtmánek, J. Reliktní borové porosty v západní části Velké Fatry. **[The relict Pine stands in the western part of the Velka Fatra [Slovakia].]** *Práce výzkum. Úst. lesn. ČSR* No. 3, 1953 (279–306). 5 refs. [Cz.cz.russ.e.]

The composition and constitution of these stands, which remain undisturbed by human influence, were investigated. Here, as elsewhere, they occupy the extreme sites unsuitable for other species; they are rather open, with a rich ground layer belonging to the *Caricetum humilis* or *Calamagrostidetum variae*. A close relationship was found to exist between the nature of the site and growth vigour. Correlations were also sought between the diameter increment for the last 10 years, and age on the one hand and the bark type (based on the scale-width/bark-thickness ratio) and cone size on the other; and also between needle length and cone size.

1547. Kotlaba, F. Ekologicko-sociologická studie o mykofloře 'Soběslavskych blat'. **[Ecological studies on the mycoflora of the Sobeslav bogs.]** *Preslia* 25 (4), 1953 (305–50). 20 refs. [Cz.russ.e.] E.M.B.

Includes species lists of fungi found in various communities with woody species (*Pinus mugo* subsp. *uncinata*/*Ledum palustre*, *Sphagneto-Eriophoretum vaginati betuleto-pinetosum*, *Betuleto-Pinetum vaccinietosum*, *Piceetum muscosum*, and *Betuleto-Pinetum muscosum*) occurring on or adjacent to these peat-bogs near Veselí-Mezimostí, S. Bohemia.

1548. Durin, L. Aperçu général sur la végétation de la forêt de Mormal. **[General review of the vegetation of the forest of Mormal.]** *Bull. Soc. Bot. Belg.* 86 (2), 1954 (247–54). 7 refs. [F.] O.B.D.

Notes on past history and exploitation and on present ecological status.

1549. Cucchi, C. Lineamenti e caratteri della macchia mediterranea nella Riviera di levante. **[Physiognomy and character of the mediterranean maquis of the Italian Riviera.]** *Ital. for. mont.* 9 (4), 1954 (177–82). 13 refs. [It.it.f.]

1550. Wraber, M. Splošna ekološka in vegetacijska oznaka višjih predelov Pohorja. **[General ecological characteristics of vegetation at the higher elevations of Pohorje [Slovenia].]** *Gozd. Vestn.* 12 (6/7), 1954 (161–78). 18 refs. [Sloven.g.]

The Pohorje range in Slovenia, 979 sq. km. in area and with an altitude from 300–400 m. to over 1500 m., has granite, gneiss, mica schists, hornblende, phyllite etc. as parent rocks and very acid soil (pH 3·5–4). The general climatic type is that of medium-height mountains in the Alps (severe winters, cool summers, precipitation 1500–2000 mm.). Despite abundance of water, some places (summits and S. slopes) have a dry, structureless soil. Roughly 60% of the area is under forest, especially the belt between 1000 and 1300 m. The range was once covered by continuous broadleaved stands (Beech), most of which were felled to supply charcoal and firewood for glass factories. The artificial pure Spruce stands with which the natural forests were largely replaced need to be converted to mixtures. On N. slopes, selective felling in farm forests has given rise to almost pure Silver Fir stands.

1551. Anić, M. Pitomi kesten na Cresu. **[*Castanea sativa* on the island of Cres [Croatia].]** *Glasn. šumske Pokuse* 11, 1953 (321–56 + 9 photos + 2 maps). 18 refs. [Croat.e.]

Chestnut is indigenous here and forms the community *Castanetum* [*sativae submediterraneo-*] *quarnaricum*. Climatic, soil and other conditions are described.

1552. Španović, T. Vrbe naših podunavskih ritova. **[Willows of the Danubian floodlands in Jugoslavia.]** *Šum. List* 78 (9/10), 1954 (506–21). [Croat.]

An ecological account dealing chiefly with the zonation of various species of *Salix* with regard to the occurrence of flooding, and its duration on alluvial floodland.

1553. Vrat, S. **Forest types in Jubbal forest division of Himachal Pradesh.** *Indian For.* 80 (10), 1954 (582–7).

The types described are subtropical Pine, moist temperate (Oak/conifer), and alpine (Birch/Fir and Birch/Rhododendron).

1554. Duong-Huu-Thoi. Introduction à l'étude de la végétation du Soudan français. **[The vegetation of the French Sudan.]** [*Proceedings*] *2ª Conferência Internacional dos Africanistas Ocidentais 1947, Lisbon* Vol. 2, 1950 (7–51 + 1 map). 14 refs. [F.]

1555. Duong-Huu-Thoi. Étude préliminaire de la végétation du delta central nigérien. **[A preliminary study of the vegetation of the central delta of the Niger.]** [*Proceedings*] *2ª Conferência Internacional dos Africanistas Ocidentais 1947, Lisbon* Vol. 2, 1950 (53–156). [F.]

A study of the vegetation of Macina.

1556. Jaeger, P., and Adam, J. G. Sur les îlots forestiers du Haut Niger. **[Forest 'islands' of the**

Upper Niger.] [*Proceedings*] *2ª Conferência Internacional dos Africanistas Ocidentais 1947, Lisbon* Vol. 2, 1950 (215–21 + 1 plate). 3 refs. [F.]

Among the orchard savanna that characterizes this region S.W. and W. of Bambaya, there occur isolated patches of tropical forest. A list is presented of species found in two examples of such forest, and the manner in which these forest 'islands' have developed is discussed. [Cf. *For. Abstr.* 10 (No. 1653).]

1557. ADAM, J. G. Les formations végétales ligneuses secondaires de Guinée Française. **[The secondary forests of French Guinea.]** [*Proceedings*] *2ª Conferência Internacional dos Africanistas Ocidentais 1947, Lisbon* Vol. 2, 1950 (223–41). [F.]

Discusses ways in which secondary forest is formed and presents a summary of species found in different types of dry and humid secondary forest in French Guinea.

1558. SCHNELL, R. Esquisse de la végétation côtière de la Basse Guinée Française. **[Outline of the coastal vegetation of lower French Guinea.]** [*Proceedings*] *2ª Conferência Internacional dos Africanistas Ocidentais 1947, Lisbon* Vol. 2, 1950 (201–14). 4 refs. [F.]

Includes descriptions of some Mangrove associations.

1559. SCHNELL, R. Quelques observations sur la reconstitution de la forêt dense en Afrique Occidentale. **[Some observations on the regrowth of rain forest in West Africa.]** [*Proceedings*] *2ª Conferência Internacional dos Africanistas Ocidentais 1947, Lisbon* Vol. 2, 1950 (243–8). 6 refs. [F.]

In the valleys and lowlands at the foot of Mt. Nimba are found rain forests differing in some degree from the primary forest of the region in species composition and in the greater density of the lower storey. These are thought to be secondary forest about half a century old. [Cf. *For. Abstr.* 14 (No. 3208).]

1560. SOUSA, E. PEREIRA DE. Subsídios para o conhecimento dos tipos fisionómicos e ecológicos da flora da Guiné Portuguesa. **[The physiognomic and ecological vegetation types in Portuguese Guinea.]** [*Proceedings*] *2ª Conferência Internacional dos Africanistas Ocidentais 1947, Lisbon* Vol. 2, 1950 (273–84). [Port.]

Brief summaries of the chief vegetation types, giving the main families and species encountered in each.

1561. GRANTHAM, D. R. **Plant ecology as an aid to colonial development: a report on work undertaken by the Overseas Food Corporation groundnut scheme in Tanganyika, and suggestions for its wider application.** *Colon. Plant Anim. Prod.* 4 (2), 1954 (110–36 + 4 maps + 2 photos). 4 refs.

Includes tables of vegetation distribution in Tanganyika, which show that definable communities exist. There is an intimate connexion between these communities and the soils on which they grow. It is the opinion of the writer that a full knowledge of a vegetation community in such an area would be sufficient to describe the soil type and cultivation history. The use of air photos is discussed.

1562. KRAJINA, V. J. **Classification of Hemlock forest region of the Columbia River basin, British Columbia.** *Abstr.* in *Bull. ecol. Soc. Amer.* 35 (3), 1954 (65). A.P.B.

Six forest associations were distinguished and defined for the area. It is proposed to map the region according to this classification.

1563. WHITFORD, P. B., and SALAMUN, P. J. **An upland forest survey of the Milwaukee area.** *Ecology* 35 (4), 1954 (533–40). 20 refs.

A survey of 22 upland forest stands was made, using the 'random-pairs' method of sampling. The data were analysed in terms of the continuum concept.

1564. GILBERT, M. L., and CURTIS, J. T. **Relation of the understorey to the upland forest in the prairie-forest region of Wisconsin.** *Transactions of the Wisconsin Academy of Sciences, Arts and Letters, Madison* 42, 1953 (183–95). 10 refs. L.S.

A study of the relationship of the shrub and herb population to the tree complex. [Cf. *For. Abstr.* 15 (No. 178).]

1565. WARE, G. H. **The lowland hardwood forests of southern Wisconsin.** *Abstr.* in *Bull. ecol. Soc. Amer.* 35 (3), 1954 (67). A.P.B.

Samples were taken of 102 stands from hardwood forests on poorly drained sites. The stands ranged from Black Willow swamps to low Sugar Maple forest. Of 32 tree species encountered 10 were found to be leading dominants in 2 or more stands. Gradations of composition were found which made it possible to arrange all the stands in a series. *Acer saccharinum, Ulmus americana, Fraxinus pennsylvanica* var. *lanceolata* and *Tilia americana* were the most frequent leading dominants encountered.

1566. KUCERA, C. L., and MCDERMOTT, R. E. **Sugar Maple-Basswood studies in the forest-prairie transition of central Missouri.** *Abstr.* in *Bull. ecol. Soc. Amer.* 35 (3), 1954 (65). A.P.B.

Frequency, density and dominance values were determined for two mesophytic forest stands in the forest-prairie transition in central Missouri. These stands, situated in deep ravines on a deep loess mantle, constitute fragments of undisturbed forest. The chief species are *Acer saccharum* and *Tilia americana*, followed by *Ulmus rubra* and *Quercus rubra*.

1567. CARLSON, M. C. **Floral elements of the Pine-Oak-Liquidambar forest of Montebello, Chiapas, Mexico.** *Bull. Torrey bot. Cl.* 81 (5), 1954 (387–99). 4 refs. O.B.D.

1568. HOSOKAWA, T. **A plant-sociological study in the mossy forests of Micronesian islands.** *Repr.* from *Memoirs of the Faculty of Science, Kyushu University* 1*E* (1), 1952 (65–82 + 5 plates). 8 refs. [E.]

Discusses the floristic composition and the environment and ecological characters of the mossy forests, found above 450 m. in Ponape and Kusaie.

1569. HOSOKAWA, T. **A synchorological study of the swamp forests in the Micronesian islands.**

Repr. from *Memoirs of the Faculty of Science, Kyushu University* 1*E* (2), 1952 (101–23 + 4 plates). 20 refs. [E.]

1570. HOSOKAWA, T. **On the structure and composition of the *Campnosperma* forests in Palau, Micronesia.** *Repr.* from *Memoirs of the Faculty of Science, Kyushu University* 1*E* (4), 1954 (199–218 + 14 photos). 20 refs. [E.]

Studies the composition and in particular the epiphyte communities of the 5 consociations, *Campnosperma brevipetiolata, Parinari corymbosa, Gmelina palawensis, Manilkara udoido* and *Alphitonia carolinensis.*

1571. HOSOKAWA, T. **On the *Campnosperma* forests of Yap, Ponape and Kusaie in Micronesia.** *Repr.* from *Memoirs of the Faculty of Science, Kyushu University* 1*E* (4), 1954 (219–43). 19 refs. [E.e.]

The structure and composition of 4 associations are described and tabulated. Among the vascular epiphyte communities 3 aerosynusia are distinguished and described.

2. SILVICULTURE

See also Nos. 1487–8, 1491–6, 1771, 2131.

1572. HOUTZAGERS, G. Houtteelt der gematigde luchtstreek. Deel 1—de houtsoorten. **[Silviculture of the temperate zone. Part 1—species.]** N. V. Uitgevers-Mij W. E. J. Tjeenk Willink, Zwolle. 1954. pp. xii + 576 + 5 plates. Many refs. [Du.] Price: *Fl.*42·50 (£4. 6*s.* 0*d.*)

The work is arranged with separate sections for conifers and broadleaved trees, and individual chapters on families, genera, or occasionally single species, with a chapter on miscellaneous soil-improving species. Within the chapters, the individual species are discussed separately, and data given include distribution (with maps), silviculture, botanical details, disease resistance, uses of the wood, and an indication of the suitability of the species for growing in the Netherlands, either for use or for ornament. There are numerous illustrations, bibliographies to each chapter, two general bibliographies on silviculture and protection, a tabulated summary of distribution data, a table showing the scientific, Dutch, English, French and German names, and an index of species dealt with.

1573. SAUER, E. Erfahrungen in der waldbaulichen Behandlung von Muschelkalkböden unter besonderer Berücksichtigung flachgründiger Standorte im Bereich des Forstamts Neckarschwarzach. **[Experience in the silvicultural treatment of soils on *Muschelkalk* (Triassic shelly limestone) with special reference to sites with shallow soils in the Neckarschwarzach forest district.]** *Allg. Forst- u. Jagdztg.* 124 (8), 1953 (235–44). 6 refs. [G.]

Briefly describes the climate, geology and soils of the *Muschelkalk* region S. of the Odenwald. Dolomitic and marly layers of this formation, sometimes also with loess deposits, have weathered to loams of varying depth, often deep and fertile in hollows. The most extreme sites are dry, shallow, stony soils on the occasional rounded hills formed by outcrops of the limestone. There, especially on the tops and southern exposures, moisture conservation is vital and quick regeneration essential to prevent permanent invasion by grass and weeds, e.g. thistles and wild rose. Choice of species and silvicultural techniques are discussed with main reference to these difficult sites. Oak with Rowan, plus other broadleaved species varying according to site, is the natural choice. Sessile Oak is native, and the shallower and stonier the soil, the more it should be preferred to Pedunculate Oak. Beech is unsuitable as a main-storey tree on the shallower soils, where it suffers from drought, but is indispensable as a soil-protecting understorey, especially on the better sites. Hornbeam is suited to both dry sites and frost hollows. Scots and Austrian Pines can be used for planting clear fellings and large gaps, but should be mixed in groups with deciduous species; they need careful planting, and large stock must be used for rapid establishment. European Larch has proved drought-resistant even on shallow soils and is recommended for mixture with broadleaved species. Japanese Larch and Norway Spruce are unsuitable. Douglas Fir, which has done well even on dry hilltops, is suitable for beating up broadleaved regeneration and for planting in gaps. Silver Fir, seen here and there, may be worth further trial in mixtures. Techniques of natural and artificial regeneration and of tending are discussed in rather broad terms, with emphasis throughout on rapid establishment and maintenance of cover by canopy and forest floor. Moisture conservation should also be assisted by leaving brushwood and slash, but the forests are mostly communal and restrictions against firewood gathering would need to be imposed. Further useful measures would be the planning of rides and roads, and the maintenance of a good forest 'wall', against wind and insolation.

1574. NELSON, I. L. **References on the management of bottomland hardwoods and Baldcypress.** Southern Forest Experiment Station, New Orleans, Louisiana. 1953. pp. 11.

Some 140 references from 1905 to 1953.

1575. HOFMAN, J. Pěstování kaštanu jedlého a škumpy jako dřevin třísloviných. **[Cultivation of Spanish Chestnut and Sumacs for tanstuffs.]** *Lesn. Knihovna* (*malá Řada*) No. 21, 1952. pp. 111. 13 refs. [Cz.] Price *Kčs.*7·22.

Brief botanical accounts of the genus *Castanea* and some species of *Rhus* s.l., followed by more detailed accounts of silvicultural characters and silviculture, with special reference to *C. sativa, Rhus cotinus* (*Cotinus coggygria*), *R. coriaria* and *R. typhina.*

1576. WEPF, W. Djaticultuur op Java. **[Teak cultivation in Java.]** *Rimba Indonesia* 3 (8/10), 1954 (378–416 + 3 photos). 17 refs. [Du.Jav.e.]

Discusses the development of the *taungya* system, details of the cultivation methods used during the first 1½ years, the value of artificial rather than natural regeneration, the need for avoiding competition with other trees, the value of interplanting, chiefly with *Leucaena glauca*, and the treatment of the interplanted crop.

22. SILVICULTURAL SYSTEMS. CONSTITUTION AND COMPOSITION OF STANDS; FORMS OF STAND

221. *High Forest Systems*

See also Nos. 1519, 1586, 1596, 1740, 1851, 2050, 2074–5.

1577. ALEKSEEV, S. V., and ŽULINSKIĬ, A. P. Ostavlenie semennyh kurtin pri trelevke lesa lebedkoĭ TL-3. **[Mechanized skidding with the TL-3 winch and the reservation of seed-bearers.]** *Lesn. Hoz.* 5 (4), 1952 (54–5). [Russ.]

Leaving seedbearers scattered over the felling sites makes mechanized skidding difficult, hence it is recommended that groups of seedbearers, each of about 0·45 ha., should be left. The distribution of such groups depends on the size of the felling site and the length of the skidding cable. On felling sites of 25 ha. (500 × 500 m.), with a skidding cable 250 m. long, two groups may be left in the middle and half a group in each of the corners (the other half being in the corners of the adjacent felling sites). The groups of seedbearers are elongated and cigar-shaped (150 m. long, 40–50 m. wide at the middle and 15 m. at the ends); if possible, their long axis should lie parallel to the direction of the strongest winds, in order to reduce the risk of windthrow. [Cf. *For. Abstr.* 15 (No. 1239).]

1578. MIERZEJEWSKI, W., and NIEDŹWIEDZKI, P. Z badań nad przebiegiem odnowienia w rębni gniazdowej. **[Investigations on the group system of regeneration.]** *Sylwan* 98 (1), 1954 (51–8). [Pol.]

Presents results of an investigation in 1951–53, in the Chojnów forest district, continuing Graniczny's research [cf. *For. Abstr.* 15 (No. 3578)]. The present paper deals with the group system in Oak, with Pine and Silver Fir as associates. Investigations were started in a Pine stand (age ca. 70 years, height ca. 20 m.) on a coniferous/broadleaved forest site; the soil was sandy loam with small clay inclusions. Clearings, both circular (10, 20 and 40 m. diam.), and rectangular (10 × 60 and 20 × 60 m.) with the longer dimension either in the N.–S. or E.–W. direction were made in the stand, and Pine, Fir, and Oak seeds in the ratio 20/10/5 were sown in cultivated strips in mid-April. It was found after 3 years that the circular 10-m. and rectangular 10 × 60 m. clearings (E.–W.) suffered from lack of sun; the circular 40-m. and rectangular 20 × 60 m. (N.–S.) clearings had too much; and the circular 20-m. and rectangular 20 × 60 m. (E.–W.) or 10 × 60 m. (N.–S.) clearings had the right amount. The best results for all 3 species were found in the 20 × 60 m. (E.–W.) clearings; the circular 20-m. clearings, while favourable to Oak and Fir, are less so to Pine. Some suppression of Pine regeneration occurred in clearings where the N.–S. dimension was small (10 m.). During the first year, all but the smallest clearings (10 m. diam.) were infested with weeds.

1579. NORDIN, V. J. **Forest pathology in relation to the management of Lodgepole Pine in Alberta.** *For. Chron.* 30 (3), 1954 (299–306). 10 refs.

Makes recommendations for controlling mistletoe infestations, and various cankers and rots, by clear-cutting in strips with proper slash disposal, or by selective cutting giving priority to fire-scarred and infected trees.

1580. EGAN, J. E. **Silvicultural foundations for National Forest cutting practice in Ponderosa Pine stands of the Southwest.** *J. For.* 52 (10), 1954 (756–66). 3 refs.

Details the significant site factors and silvicultural characters of *Pinus ponderosa*, describes Pearson's improvement selection system, outlines the National Forest harvesting programme and gives felling prescriptions.

222. *Coppice, Pollarding and Lopping Systems*

See also Nos. 1596, 2531.

1581. IHARA, T. **[Studies on management methods for coppice forest in the coastal 'wind-collision' zone.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 70, 1954 (1–31). 6 refs. [Jap.jap.e.]

In experiments in 1940 and 1947 in S.W. Shikoku, strip felling at right angles gave better results than strip felling parallel to the direction of the main wind, as regards damage, yield, growth and canopy structure. Best results were obtained by felling a strip half the breadth of the strip left. Damage was greater in strips where trees smaller than 4 cm. d.b.h. were left, but growth was better.

1582. SILVY-LELIGOIS, P. L'amélioration des taillis-sous-futaie. **[The improvement of [Oak] coppice-with-standards.]** *Bull. Soc. for. Belg.* 61 (11), 1954 (441–59 + 7 photos). [F.]

Briefly surveys the state of the Oak coppice-with-standards forests of N.E. France, the causes for their present degraded state, and measures for their rehabilitation, by conversion to conifer, Oak, or mixed high forest, by partial conversion, or by better management as coppice.

1583. RABOUILLE, G. De la production d'un taillis sous futaie en cas de conversion immédiate. **[The yield of coppice-with-standards in process of immediate conversion.]** *Rev. for. franç.* 6 (10), 1954 (581–90). 2 refs. [F.]

1584. PEŘINA, V. Převod dubové pařeziny se zřetelem k biologii půdy. **[Soil biology and the conversion of Oak coppice [to high forest].]** *Práce výzkum. Úst. lesn. ČSR* No. 4, 1954 (255–75). 18 refs. [Cz.cz.russ.g.]

Group fellings were started in 1938 in Oak coppice stands at the Opočno experimental station, and Lime, Hornbeam, Silver Fir and Spruce were planted in, chiefly in pure groups. Lime alone survived by 1952 when examination showed improvement in the chemical and microbiological properties of the soil and the quality of humus, both the pH and the Ca content of the top layer being increased.

226. *Changes of Silvicultural System. Conversion (by System or Species)*

See Nos. 1582–4, 1586, 2531.

228. *Constitution and Composition of Stands; Choice of Species and Form of Mixture; Tree Classes; Forms of Stand*

See also Nos. 1542, 1546, 2029, 2046, 2048–9, 2066.

1585. Olberg, A. Über die Kennzeichnung der Bestandesstruktur. **[The characterization of stand structure.]** *Allg. Forst- u. Jagdztg.* 124 (8), 1953 (221–6). [G.] [Institut für Waldbautechnik, Univ. Göttingen.]

Stresses the inadequacy of the Kraft tree classes and their later modifications for describing anything but pure, even-aged stands, and puts forward a new system designed for all types of stand—pure or mixed, even- or uneven-aged, indicating their vertical structure unambiguously and giving a good insight into the movement of trees from class to class. The main criterion is relative height, there being six classes: (1) predominants, (2) dominants, and, all defined in % of the median height of this class, the following height ranges—(3) under the min. height of (2) but $\not<$ 75% of its median height; (4) $<$ 75, $\not<$ 50%; (5) $<$ 50, $\not<$ 25%; (6) $<$ 25%. To the class number are appended three figures indicating successively: degree of overhead cover; crown development; and probability of maintaining position or of moving upwards or downwards. Only two degrees, 1 or 0, are provided in each place, viz.: (*a*) not overtopped ($>$ ¼ of crown overshaded)—1; overtopped—0; (*b*) crown well developed in all directions—1; showing any form of suppression or deformation—0; (*c*) in classes 1 and 2, at least maintaining its position, in the other classes tending to rise in class—1; in classes 1 and 2 a tendency to sink, and in the others at least not to rise—0. Thus 2·101 signifies a dominant with crown free above but laterally suppressed, though not dropping behind its class in growth. Old reserve trees and wolf trees are not classified but can be denoted by the symbols Ü and P. Appraisal of (*c*) is admittedly subjective and must take account of the presumed effect of the intended treatment upon the development of the individual tree, but experimental trials suggest that the rating is workable with sufficient experience and practice. The suggested procedure is to measure the height of as many trees as possible, chalking the height on each stem, after which it is easy to estimate the remaining heights and to allocate trees to their classes. The max. height of class 2 should be defined in such a way that this class will contain considerably more trees than class 1. Nine examples are given to illustrate the application of the classification to various types of stand, from pure even-aged Spruce to Beech/Silver Fir/Spruce virgin forest.

1586. Jeník, J., Peřina, V., and Slavík, B. Ekologie kotlíku s olší lepkavou (*Alnus glutinosa* Gaertn.) v borové monokultuře. **[Ecology of a group felling, in a pure Scots Pine plantation, [planted up] with *A. glutinosa*.]** *Práce výzkum. Úst. lesn. ČSR* No. 4, 1954 (53–90). 27 refs. [Cz.cz.russ.g.]

In the Bolehošt district, in December 1947, several group fellings were made in practically pure Pine plantations (ca. 45 years old; mean height 14 m.; density 0·9; with some self-sown Birch and some planted Spruce of the same age as the Pine, lingering as underwood only 2–3 m. high; on deep diluvial sands with an acid soil which, though somewhat podzolized, is naturally poor rather than degraded). In Sept. 1948, the groups were cultivated to 20 cm. depth and isolated from the Pine stand by a trench 1 spit deep and 1 spit wide, followed in November by broadcast application of 30 kg. ground limestone per group, and planting of 2-year Alder at 1 × 1 m. spacing, each plant receiving 1 kg. of gabbro [dust?], in April 1949. The authors describe a study made in 1952 of one of these groups (elliptical, ca. 10 × 15 m., the long axis running N.E.–S.W.) with chief reference to possible soil changes, microclimate, and root systems of the surrounding Pine trees and of the planted Alder. The chief conclusions from the results, which are discussed and given in graphs, diagrams and tables comparing the Alder group (*a*) with the surrounding Pine plantation (*b*), are as follows: (*a*) showed more rapid litter decomposition and a different soil microflora, but no significant improvement in humification or in the content or turn-over of soil N, there being thus no evidence that the Alder improved the N régime of the soil. As the pH also remained so low, the NH_3 produced in ammonification would be available only in very small quantities to nitrifying bacteria. The liming and gabbro fertilizer treatments appear to have had very little effect in relation to their cost. About 10% more rain reached the ground in (*a*) than in (*b*), and soil moisture was therefore higher except in dry periods in the growing season, when transpiration by the Alder and ground flora reversed the situation. Evaporation was less, and temperatures more equable in (*a*). The root studies showed that the bulk of the Pine roots were concentrated in the upper soil horizons, had grown back under the trench, and were competing with the Alder roots; it would therefore be necessary to repeat the trenching at 2- to 3-year intervals, when the regenerated Pine roots would be young and easily cut through. The root systems of the Alder were also adapted to obtain their water and nutrients chiefly from the upper soil horizons. Use of Alder as a pioneer species for such conditions appears to be justified by its early rapid growth and the quick provision of cover, but the spacing used was too wide to secure full cover and so also presumably too wide for it to exert its greatest effect on microclimate and biological processes in the soil. At present, the question of introducing other species in mixture remains to be solved from both silvicultural and economic points of view.

1587. Junaš, G. G. Projavlenie mežvidovoĭ vzaimopomošči v lesnyh posadkah na suhih djunnyh peskah Buzulukskogo bora. **[Mutual assistance among species used for the afforestation of the dune sands of the Buzuluk Pine forest.]** *Lesn. Hoz.* 5 (2), 1952 (56–61). [Russ.]

The afforestation of barren land within the Buzuluk forest (situated at the extreme S.E. limits of the natural range of *Pinus sylvestris* in European Russia) has always been a difficult problem on account of poor soil—dry dune sand with groundwater at a depth inaccessible to the roots of even 100-year-old trees. In order to illustrate the superiority of Pine/Birch (various forms of 50/50 mixture; spacing 1 × 0·5 m.) to pure Pine plantations on such sites, the author quotes figures, partly from literature, for plantations in the Borovoï experimental forest up to an age of 33–36 years (inspections of 1945–47, with notes on some root studies made in 1948). The superiority of the mixtures was shown in survival, % of healthy trees, height and diameter. Some data are also included for shelterbelts of pure Pine and Pine/'Balsam Poplar' [*Populus balsamifera*?]: here no marked differences were observed, except in the better root development of the Pine in mixture. In other localities with better soils, the Poplar suppressed the Pine.

1588. LESAGE, G. La hêtraie normande: peuplement artificiel. **[The Norman Beech wood: an artificial stand.]** *Rev. for. franç.* 6 (11), 1954 (649–56 + 5 photos.) [F.]

Discusses the Beech woods of Normandy and concludes that they are artificial in origin and that their continuance is dependent on silvicultural treatment.

23. REGENERATION AND FORMATION OF STANDS

1589. TAYLOR, C. J. La régénération de la forêt tropicale dense dans l'ouest africain. **[Regeneration of the dense tropical forest in West Africa.]** *Bois For. Trop.* No. 37, 1954 (19–26). [F.E.e.span.]

Discusses the merits of natural and artificial regeneration and the factors determining which shall be used in a given case.

231. *Natural Regeneration*

See also Nos. 1518 *et seq.*, 1740, 2044.

1590. WALTON, A. B. **The regeneration of dipterocarp forests after high lead logging.** *Emp. For. Rev.* 33 (4), 1954 (338–44 + 4 photos). 3 refs.

The evidence of sampling and observation in the Philippines and North Borneo lead the writer to the conclusion that successful regeneration of dipterocarp forest (i.e. a satisfactory proportion of commercial species) can be obtained after high-lead logging, if the forest is worked on a rotation of 80–100 years and seedling regeneration (given suitable silvicultural assistance) is relied on to complete the stocking. The data from 5 sample-plot enumerations are given and analysed. [Cf. *For. Abstr.* 13 (No. 4069); 14 (No. 2100).]

1591. KERMODE, C. W. D. **Seedling coppice and the seedling coppice system of regeneration.** *Emp. For. Rev.* 33 (4), 1954 (366–74). 4 refs.

Many species of the mixed deciduous forest of Burma can, as seedlings, survive the usual type of surface forest fire and live on for years though burnt back annually, and many can also survive the more intense fire caused by felling and burning the overhead cover. Enumerations show that there is normally, in such forests, an advance growth of seedling coppice equal in density to at least half plantation (6 × 6 ft.) stocking, and often of much higher density. Valuable species, especially Teak, are often well represented. This advance growth can be helped on to establishment by cutting and burning the overstorey and subsequent tending. *Taungya* cultivation can be done for one year without noticeable mortality in the advance growth and where this is done regeneration can be established very cheaply. The chief obstacle is the fact that the soils of these forests are not suitable for growing hill paddy and are therefore not attractive to the *taungya* cutter. The education of the cultivators to grow other crops, e.g. beans, is discussed. Where necessary the resulting stand can be beaten up with *Xylia* or Teak stumps.

1592. JAMES, G. A., and HAYES, G. L. **Highlights of a Port-Orford-Cedar [*Chamaecyparis lawsoniana*] regeneration study.** *J. For.* 52 (11), 1954 (852–5). 1 ref.

Studies were made on areas: (1) clear-felled and burned 33–50 years, and re-burned ca. 12 years, before the study; (2) clear-felled and burned 7–14 years before; and (3) subjected to partial cutting. Of these, (2) are more completely restocked with desirable species than (3). *C. lawsoniana* is better represented in the regeneration than in the parent stands on both (2) and (3). (1) had regeneration inferior in both stocking and composition. The number and propinquity of seed trees strongly influenced regeneration of *C. lawsoniana*, which was adversely affected by dense ground cover. No significant effect on seedling occurrence was found for geological formation, soil type, soil moisture, soil depth, seedbed, humus and litter depth, aspect, slope, slash burned or unburned, b.a. of residual stand, and Douglas Fir site class. Either clear felling in strips ⩾ 10 chains wide, or sheltered cuttings in which chiefly other species are removed, should improve Cedar regeneration.

1593. BRENDER, E. V., and NELSON, T. C. **Behavior and control of understory hardwoods after clear cutting a Piedmont Pine stand.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 44, 1954. pp. 17.

A study of the effect on understorey hardwoods and shrubs of clear-felling the Pine overstorey showed, in the 6 years after felling, spreading of the crowns of Oaks and Hickories present but no increase in number, increase in the number and crown spread of shrubs, and slight increases in the relative importance of intolerant hardwoods (Sweetgum, Blackgum, Yellow Poplar and White Ash) and of tolerant small hardwoods (Dogwood, Serviceberry and Holly). Partial brush cutting and burning (1), complete brush cutting (2), and complete brush cutting and grubbing the hardwoods (3) were compared; all treatments increased the amount of low and decreased the amount of high shade as compared with the controls, changes being greater for (1) and (3) than for (2). (2) had no permanent beneficial effect on area shaded, level of shade or number of stems; hardwood cover was heavier than

in the control after 6 years. (1) gave a reduction in total shade for the first year and reduction of high-level shade for the first 2 years, but by the end of the 6th year the area shaded exceeded that of the control and was increasing. (3) reduced total shade for the first 3 years and the effect lasted through the 6th year, the level of shade also being lowered; however, shrub cover was twice that on the control.

1594. TEIKMANIS, A. Några studier över de mossrika granskogarna i Norrland och deras föryngringsproblem. **[Studies on the mossy Spruce forests of N. Sweden and their regeneration problems.]** *Norrlands SkogsvFörb. Tidskr.* 1954 (3), (307–434). 4 pp. of refs. [Sw.g.]

The main Spruce forests of N. Sweden lie in a broad belt, between 62 and 66° N., stretching from the mountains of the Norwegian border to the coast. They can be divided into 3 regions—mountain, inland, and coastal—all characterized more or less by moss/shrub cover. Natural regeneration is generally poor, particularly in *Hylocomium/Myrtillus* cover types, but is satisfactory in the Pine forests occurring here and there on suitable sites among the Spruce. The Spruce forests, particularly in the inland region, are 'degenerate', i.e. show poor increment, crown dieback, and growth of lichens (*Alectoria sarmentosa*, *A. jubata* etc.) on stems and branches. Pollen analyses show that Spruce increased suddenly in quantity ca. 1000 B.C. at the beginning of the sub-atlantic climatic period. The climate and topography of the Spruce belt are discussed in detail. Forest fires have been important in the belt only during the period 1500–1900 A.D. when settlement was taking place. Their general effect would appear to be the creation of good growth conditions for Pine, Spruce and especially Birch, but considerably less seed production. To-day the practice of burning over clear-felled areas, by killing the moss cover, makes natural regeneration possible, but if it is for any reason repeated, especially on dry sites, it may create large areas of heathland. In the 16th to 19th centuries, exploitation was confined to Pine (for tar, sawtimber, masts, poles etc.) and Birch (for potash). The effect of this was to encourage the spread of Spruce particularly in mixed forests. In Pine/Spruce forests, occurring usually on good sites at 100–300 m. altitude, the change from the more open mixture to dense pure Spruce encouraged the spread of thick moss, preventing natural regeneration; Spruce on these sites is usually slow-growing and poor. Similar results followed the elimination of Birch from mixed Birch/Spruce forests, partly because of the greater density of the Spruce and partly from the reduced evaporation and consequent higher moisture, which favours moss growth. Further research is needed on the biological requirements of the moss and on its direct effect on trees. Investigations made on natural regeneration in gaps in the forests on 3 sites at different altitudes are described. The following conclusions are drawn: (1) Regeneration is better at lower (60–280 m.) and almost non-existent at higher (300–470 m.) altitudes. (2) The good regeneration on small burnt patches shows that lack of regeneration is due to the moss cover, not to lack of seed. (3) Slash collected into small piles and fallen trees might well be burnt during the winter, thus reducing the moss cover. (4) Groups of young Birch appear to favour natural regeneration of conifers and should be left. (5) No clear picture of the effect of soil cover on natural regeneration was obtained, but *Hylocomium*, *Deschampsia* and *Polytrichum commune* appear to be the most harmful. (6) When there are small differences in height within a site, regeneration appears to be better on the higher ground. The importance of the Spruce belt and of natural regeneration in forest, and state policy are discussed.

1595. BORSOS, Z. Gyertyános tölgygazdálkodás különös tekintettel a természetes felújításra. **[Management of Hornbeam/Oak forest with special reference to natural regeneration.]** *Erdö* 2 (4), 1953 (307–21, 390–1, 394). [Hu.russ.g.]

Hornbeam in Hungary has usually been considered a dangerous rival of other valuable forest species, although its soil-improving properties are well known. The author here makes a survey of the Hornbeam/Oak stands in the Vas district where 5 types are distinguished: (1) Stands deliberately converted to Hornbeam from Oak and Birch on degraded soils. (2) Former Oak forest now invaded by Hornbeam because of deficient regeneration and careless management. (3) Oak mixed with occasional Hornbeam. (4) Oak with a Hornbeam understorey; these are either nearly mature Oak with a 1- to 5-year-old Hornbeam understorey, or underplanted Oak polewood or sawtimber stands. (5) Oak/Hornbeam stands that have reached a natural equilibrium. These types are discussed and the management of (5) is described, this being the type best calculated to give the highest yields within the shortest time. Future measures are also reviewed for establishing new forests and managing the pure Oak and the existing Oak/Hornbeam forests.

1596. TURBANG, J. Contribution à l'étude de la régénération naturelle du chêne en Lorraine Belge. **[Natural regeneration of Oak in Belgian Lorraine.]** *Bull. Inst. agron. Gembloux* 22 (1/2), 1954 (90–133). 38 refs. [F.] E.M.B.

A detailed study made in 3 stands representing the principal forest types of the region: (1) Bois de Fouches, mainly *Quercus sessiliflora* and Beech coppice-with-standards on sandstone and gravel—(*a*) *Quercetum medioeuropaeum* and (*b*) *Quercetum Carpinetum luzuletosum*; (2) Bois d'Udange, mainly *Q. sessiliflora* and Beech high forest on argillaceous schist—*Quercetum Carpinetum asperuletosum*; and (3) Fraiche-Bois de Hachy, mainly *Q. robur* in the senile stage of coppice-with-standards, on marlstone —(*a*) *Quercetum Carpinetum stachyetosum* and (*b*) *Quercetum Carpinetum filipenduletosum*. Topography, geology, soils and vegetation of the region are described, along with the genetic characteristics of the seedbearers and factors affecting natural regeneration. Data are presented on the heights attained by seedlings at different ages, and the influence of competition and shading. Detailed recommendations are given for group regeneration fellings in each type.

232. *Artificial Regeneration*

1597. Lyon, N. F. **Silvicultural research in seeding and planting.** *Pulp Paper Mag. Can.* 55 (11), 1954 (158 . . . 162). (*Woodl. Sect. Index, Canad. Pulp Pap. Ass.* No. 1402 (*F*–2).)

A summary in some detail of the programme undertaken by the Ontario Division of Research.

1598. Wakeley, P. C. **Planting the southern Pines.** *Agric. Monogr. U.S. Dep. Agric.* No. 18, 1954. pp. v + 233. 811 refs.

A comprehensive work with sections on general policies, seed, nursery practices, planting and plantation care.

232.1. Choice and Trial of Species, Races etc.

See also Nos. 1703, 1708, 1720, 1755, 1761.

1599. Stern, K. Zur Entwicklung eines forstlichen Sortenversuchswesens. [**The development of a method for varietal trials of forest trees.**] *Z. Forstgenet.* 3 (5), 1954 (91–8). 24 refs. [G.g.e.]

Discusses the planning of trials and the need for basing evaluation on long-term comparisons of the whole process of growth.

1600. King, W. B. **Douglas Fir.** *Timb. Tr. J.* 211 (4078), 1954 (983–4).

Considers the site and silvicultural requirements of the three main varieties, disease, thinning and production, and pleads for the more extensive planting of this species, which at 50 years has 122% more volume than Scots Pine and 31% more than Norway Spruce, these three making up 80% of Britain's softwood imports.

1601. Burgos, J. A. Un estudio de la silvicultura de algunas especies forestales en Tingo María, Peru. [**The silviculture of some forest species at Tingo María, Peru.**] *Carib. For.* 15 (1/2), 1954 (14–53). 31 refs. [Span.span.]

A report on the first 5 years' work by the forestry section of the Tingo María Agricultural Experiment Station in the study of native species with a view to afforestation, describing 17 of the most important timber-producing species, most of them native to the district, along with accounts of methods of propagation from seed or cuttings, transplanting, pests, and suitability for live hedges. The initial results of plantations already established are given, with costs and data on height and basal area of stands on two different types of soil. Estimates are also given, based on these growth data, of the time taken for the trees to reach merchantable size. Finally a plan and estimated costs are presented for the establishment of a 100-ha. plantation of *Swietenia macrophylla.*

232.11. *Species Trials (by Localities), including Forest Gardens, Trials of Exotics etc.*

See also Nos. 1475–80, 1491, 1698–1700, 1705–6, 1710–12, 1714–6, 1719.

1602. Ernst, F. Die Bedeutung der Strobe für die Aufforstung von Kahlflächen besonders in Spätfrostgebieten. [***Pinus strobus* for afforestation of denuded areas, particularly in regions where late frosts occur.**] *Forstwiss. Cbl.* 73 (5/6), 1954 (166–75). [G.]

Presents some conclusions from a study of *P. strobus* in Ebersbergen Park. The original forest was destroyed by nun moth (1889–92) and storms (1895). In replanting (1900–1910) *P. strobus* was used both pure and in mixture. Observations are presented on the tree's reaction to drought, diseases, growth, yield, and uses of the timber. The strong root development of this species, first at shallow, and later at deep levels, makes it very suitable for afforesting bare land, especially where late frosts have to be reckoned with and nurse species are necessary, for *P. strobus* is equally suitable as a nurse and for the main crop.

1603. Dušek, V. Aklimatisační pokusy s blahovičníkem v našem státě. [**Acclimatization trials with Eucalypts in Czechoslovakia.**] *Lesn. Práce* 33 (6), 1954 (268–77). [Cz.]

An account of trials in Slovakia. The failure of the first trials is mainly attributed to the seedlings having been kept too long in frames: Eucalypts, being eminently light-demanders, become etiolated in frames with their humid and stagnant air, and there is greater risk of fungus attack. The resulting lack of frost-hardiness caused great mortality of seedlings during the winter. Trials in grafting Eucalypts on stocks of *Elaeagnus* spp. gave no positive result. The results of planting Eucalypts of different seed origin (S. American and Egyptian, probably *E. viminalis*, and Italian and Russian, probably *E. globulus*), with more than 300 plants left for overwintering in the open, with or without cover, can be summarized as follows: (1) best results were obtained when planting was done in trenches; (2) leaves were the best winter cover; (3) the plants from S. American and Egyptian seed proved hardier than those of Italian and Russian origin; (4) it does not appear possible to protect the aerial part of the plant against destruction by frost; (5) stronger plants were frost-hardier than weaker ones; (6) plants with a lower content of essential oils and tannins proved more resistant; (7) it seems that the only way of growing Eucalypts in Czechoslavakia may be in the form of coppice cut annually; (8) for early establishment, planting must be done early in spring, using 'mossed' plants [i.e. with root-balls of fine soil, peat and sand, wrapped with a layer of moss to prevent drying; such plants are prepared in March and kept under glass until the late frosts are over].

1604. Petrović, D. S. Strane vrste drveća (egzoti) u Srbiji. [**Exotic tree species in Serbia.**] *Posebna Izdanja, Srpska Akademija Nauka, Beograd* No. 182, 1951. pp. 182. 11 refs. [Serb.serb.g.]

Describes 25 conifer and 47 broadleaved species, giving height curves and stem analyses for most, and the localities in Serbia where they grow.

1605. Protasov, A. N. Kuljtura sibirskoĭ listvennicy v zone temnokaštanovyh počv Kazahstana. [**A Siberian Larch plantation in the dark-chestnut soil zone of Kazakhstan.**] *Lesn. Hoz.* 5 (2), 1952 (31–3). [Russ.]

Very good growth has been shown by a 100-sq. m. plot of Siberian Larch near Akmolinsk, on a dark-chestnut clay-loam with a 13- to 17-cm. humous horizon. The local climate is markedly continental (mean annual temperature +1·4° C.; monthly means: Jan. −17·7°., July +20·4°; mean annual rainfall 311 mm.). The plot is surrounded by *Populus nigra* (mean height 18·5 m.) and has 3 storeys: (*a*) Larch (48 years old; initial spacing 2·2 × 6·0–6·5 m.; mean height 16 m.; mean d.b.h. 21 cm.) with some Pine (39 years old; height 14·75 m.; d.b.h. 20 cm.); (*b*) *Tilia cordata* (height 11·5 m.; d.b.h. 12·8 cm.); and (*c*) 'Green Ash' [*Fraxinus pennsylvanica*?] (height 7 m.; d.b.h. 7·5 cm.); with (*d*) an underwood of *Caragana arborescens*. The growth rate of the Larch is that of quality-class II. Results of a stem analysis of a sample tree are tabulated and briefly compared with other results for the same species, of quality class I, on chernozem in northern Kazakhstan.

1606. Balašov, P. K. Orehi v zone suhih stepeĭ na pogrebennyh kaštanovyh počvah. [**Juglans species on the chestnut soils of the arid steppes.**] *Lesn. Hoz.* 5 (4), 1952 (27–9). [Russ.]

Trials with 5 species of *Juglans* at the Kamyshin Experimental Station of VNIALMI showed *J. nigra* to be the most promising for the chestnut soils of the Lower Volga region but only on sites with high groundwater, e.g. irrigated fields, valley bottoms etc. *J. nigra* was the only comparatively frost-hardy species among those tested, and the only one to form a straight stem. *J. mandshurica* and *J. cinerea* showed poor resistance to drought and dry winds, and the former was subject to late-frost damage. *J. regia*, though less sensitive to lack of moisture, was not sufficiently frost-hardy. *J. cathayensis* was the least promising of all.

1607. Rovskiĭ, V. M. O perspektivah kuljtury èvkommii v Sredneĭ Azii. [**The possibility of growing *Eucommia ulmoides* in Central Asia.**] *Lesn. Hoz.* 5 (4), 1952 (16–8). [Russ.]

Cultivation of *Eucommia ulmoides* started in the USSR on the Black Sea coast of Abkhazija in 1931 and has been extended to colder regions (Krasnodar, Crimea, Moldavia, Ukraine, Central Asia) since it has proved frost-hardy. In Central Asia, near Tashkent, a 10-year-old tree had only the shoot tips killed by frosts of — 27 to — 29° C.; seedlings and young plants seem to be more sensitive to winter cold, although unaffected by summer heat and a dry atmosphere. At Denau in Uzbekistan, seven trees planted in 1939 have produced only ♂ flowers. The cultivation of *Eucommia* is possible in Central Asia only on irrigated sites; although it is believed to prefer fertile, moist, light soils, it has shown good development on heavy clay-loams. At Stalingrad, the leaves of 1- to 3-year-old plants had a higher gutta content (2·4–3·5% by weight) than in Abkhazija (2·03–2·67%).

1608. Khan, M. I.-u.-R. **Exotic forest species for West Pakistan.** *Pakistan J. For.* 4 (2), 1954 (112–7).

On the basis of a comparison of climates, recommends a number of species from the S.W. United States, Mexico, Australia, the Mediterranean, W. Africa and the Middle East and from the Thar desert of N. India and Pakistan, for trial in W. Pakistan.

1609. Chelvarajan, B. K. **Balsa (*Ochroma lagopus*).** *Comp. Wood* 5 (1), 1954 (125–9). 6 refs. P.R.

Balsa can be grown with success on suitable sites in India (e.g. in Bangalore). Results of tests indicate the possibility of producing wood suitable for the aircraft industry.

1610. **Research studies: the mountains; shallow loam problem area.** *Carib. For.* 15 (1/2), 1954 (8–9). (*Rep. U.S. trop. For. Exp. Sta.* 14, [1953?].)

Potential forest productivity of this area of Puerto Rico is high, but the land needs tree cover to protect the shallow, erodible soil. *Casuarina equisetifolia* has given best growth of the species tested. A *Pinus caribaea* plantation has finally failed after 6 years. Underplanting of *C. equisetifolia* plantations and of natural forest with *Swietenia macrophylla* shows great promise. Experimental 1-year-old underplantings of *Hieronyma clusioides* in the Toro Negro forest have also survived well. [Cf. *For. Abstr.* (Nos. 2493–4).]

1611. **Research studies: the mountains; deep clay problem area.** *Carib. For.* 15 (1/2), 1954 (9–11). (*Rep. U.S. trop. For. Exp. Sta.* 14, [1953?].)

Research in this area of Puerto Rico has been concerned mainly with the introduction of superior species into open areas and secondary forest, and with the improvement of the existing forests. For reforestation the following species have been successful: *Eucalyptus alba*, *Fraxinus* sp., *Cedrela mexicana* and *Tabebuia argentea*. *Hibiscus elatus* has grown well, but is suffering from attack by a scale insect. Direct sowing of *Swietenia macrophylla* in the wettest portion of the area shows great promise. In experiments to improve secondary Tabonuco-type stands in the Luquillo forest, girdling alone has successfully eliminated many species. A basal area of 80 sq. ft./acre is sufficient to control invasion by climbers.

1612. **Research studies: the mountains; laterite problem area.** *Carib. For.* 15 (1/2), 1954 (11–2). (*Rep. U.S. trop. For. Exp. Sta.* 14, [1953?].)

Swietenia mahagoni has proved capable of survival in this area of Puerto Rico, but growth is slow, and form frequently poor.

1613. Claveria, J. R. **Growing Benguet Pine (*Pinus insularis* Endl.) in Cebu Province.** *Philipp. J. For.* 9 (1/4), 1953 (1954), (57–76 + 12 photos). 14 refs.

P. insularis grows naturally in the highlands of Luzon (between 15 and 20° N. lat.) and has been used experimentally in Cebu (ca. 10° N.) as soil cover to prevent erosion, as a nurse crop for broadleaved species such as *Pterocarpus indicus* and *Pentacme contorta*, and as a source of Christmas trees. Notes are given on its silvicultural characters and propagation. It does not regenerate naturally in Cebu. Possible uses of the wood are discussed.

1614. [**Symposium on Radiata Pine in New Zealand.**] *N.Z. J. For.* 6 (5), 1953 [1954] (375–404).

Includes the following papers: Development in our exotic forests (*G. H. Hocking*); Some vegetation changes following a crop of 23-year-old *Pinus radiata* (*J. E. Henry*); Some characteristics of *P. radiata* that contribute to its importance in afforestation in Otago and Southland (*C. R. Crutwell*); The limitations of Radiata in exotic state forests in Canterbury (*R. M. Martin*); Grade in timber and round products of *P. radiata* (*J. S. Reid*).

1615. BRYAN, W. ***Pinus radiata* and associated species in the granite belt [of Queensland].** *Aust. For.* 18 (1), 1954 (15–20.) 3 refs.

A successful plantation project has been established in the Granite Belt of Southern Queensland. *Pinus radiata* is the main species now being planted, and its behaviour here, in the northern extreme of its present Australian range, is of interest. Problems of the past and present are discussed, and the routine silvicultural treatment is outlined. *Author's summary.*

232.12. *Races and Provenance Trials*

1616. VINCENT, G., and FLEK, J. Pokusné plochy provenienční se smrkem. **[Norway Spruce provenance trial plots.]** *Práce výzkum. Úst. lesn. ČSR* No. 3, 1953 (205–36). 35 refs. [Cz.cz.russ.e.]

Measurements in 1952–53 in the international experimental plots near Frydek (Silesian Beskid range), planted in 1942–43 with Austrian, Jugoslavian, Bulgarian, Italian, Polish, French, Czech, Finnish, Norwegian, Swedish, Lithuanian, German and local provenances, showed, *inter alia*, a correlation between stem height, stem diameter, the standard deviation of stem height, and the length of the apical shoot needles with the geographical latitude of the place of origin, stem height being the most sensitive indicator of all. The results indicate that Spruce from places situated 2° further South can be safely and with success cultivated in the Beskids.

1617. VINCENT, G., and POLNAR, M. Pokusné provenienční plochy s borovicí. **[Scots Pine provenance trial plots.]** *Práce výzkum. Úst. lesn. ČSR* No. 3, 1953 (237–78). 47 refs. [Cz.cz.russ.e.]

Successive measurements (latest 1950) of different provenances planted in 1938–40 in 3 international provenance plots in southern Bohemia gave the following results: There is a correlation between the geographical latitude of the place of origin of the plants and (*a*) stem height, and (*b*) stem diameter, as well as (*c*) length of the apical shoot needles; (*a*) is a more sensitive indicator of the change in site conditions than (*b*) or (*c*). No correlation was found to exist between latitude and the standard deviation and coefficient of variation of stem heights, or the needle density on the apical shoot. It was found that Pines originating from places situated 2° further northwards (western Poland) grew more rapidly in southern Bohemia than Pines of local provenance. [Cf. preceding abstract.]

1618. SCHMIDT, W. Kiefernherkünfte und Einzelstammabsaaten auf der Versuchsfläche Kaltenbronn/Schwarzwald. **[Scots Pine provenances and single-tree progenies at the Kaltenbronn/Schwarzwald research area.]** *Züchter* 24 (6), 1954 (167–74). 14 refs. [G.] E.M.B.

Conclusions based on an examination of this area some 17 years after its establishment as part of a large-scale trial include the following: (1) Progenies of some individual trees are well above average for their provenance and are suitable for further breeding trials. (2) There are clear differences in branch thickness between forms from eastern (E. Prussia, the central mountains—Riesengebirge, Fichtelgebirge and Bayrischer Wald—and E. and lower Silesia) and from western (higher Schwarzwald, Rhine/Main plain and Brandenburg) Germany, the former having fine and the latter (including the mountain forms from the higher Schwarzwald) thick branches. (3) The Schwarzwald and E. Prussian Pines are outstanding for straight stems and rapid recovery from leader damage; the former is, however, inferior in rate of growth. (4) The straightness of stem and resistance to snow damage of the Schwarzwald and E. Prussian Pines did not appear to be affected by site differences, while the Rhine/Main Pines in the edge plots, shaded by the neighbouring old forest, and very damp, showed bending and snow damage %s well above their average in the rest of the area. [Cf. *For. Abstr.* 7 (No. 81).]

232.13. *Trials of Hybrids and Other Products of Tree Breeding*

1619. DILLER, J. D. **A potential timber-type Chinese Chestnut.** *For. Res. Note Ntheast. For. Exp. Sta.* No. 37, 1954. pp. 4.

An examination of test plantings in different parts of the U.S.A. of *Castanea mollissima* from seed from Nanking University (U.S. Department of Agriculture accession number T.1. 58602) suggests that this Chestnut, planted closely and on good soil, may be a hardy timber-type tree, suitable as a substitute for *C. dentata*. Tabulated results of performance after 13 growing seasons in Pennsylvania show its superiority to other Asiatic importations (Chinese Chestnut and Japanese Chestnut [*C. crenata*] of different provenances).

232.2. Preparatory Work, Auxiliary Measures

See also Nos. 1576, 1591, 1650, 1709, 1760–1, 1770, 1879.

1620. SHAW, R. G. **Machinery research.** *Rep. For. Res. For. Comm., Lond. 1952/53*, 1954 (74–5).

Work has continued on a special plough designed to throw both to left and right with a subsoiled path down the centre of the furrow. The object is to obtain the maximum width of cover to suppress weed competition, and a total width of 48 in. is achieved. Very effective on the easier heathland sites, it is not suitable, in its present form, for the harder, rock-infested sites. On ground within its scope, costs are low as it is designed to operate as a mounted implement on a Fordson Major half-track tractor.

1621. LHOTSKÝ, J., and PASÁK, V. Mechanická příprava půdy s použitím krycích rostlin jako prostředek k zalesnění zastaralých holin. **[Mechanical preparation of soil and the use of cover plants as a means of reforesting old felling sites.]** *Sborn. čsl.*

Akad. zeměd. 27*B* (4), 1954 (379–412). 36 refs. [Cz.cz.russ.g.] C.G.B.

Presents the preliminary results of mechanical soil preparation (1951–53) in a trial area on old felling sites at Čížov, overgrown with weeds. The 2-ha. plot was freed from stumps by bulldozer, and deep ploughed in autumn, 1951; in summer, 1952, the new weeds were ploughed in; in spring, 1953, the soil was disked, and Pine, Oak and Lime were sown and planted. Compared with controls, the prepared soil showed a higher moisture content, month by month, during the first 2 years (1952–53). The air capacity and total porosity of the prepared soil were somewhat smaller. The absolute water capacity of the cultivated soil was more favourable than, and the absolute air capacity the same as, controls; in both cases the figure was much below the mean value for the forest profile.

Experiments with cover plants, such as *Calamagrostis epigeios*, lupins, oats and potatoes, grown in rows, showed that their effect (plus those of the weeds), in the microclimate between the rows during a dry sunny day was intermediate between that of a bare surface and a total cover; the maximum temperature between the rows of cover plants was found to be at the soil surface, rows running E.–W. had a lower maximum.

In height growth, Oak seedlings showed the largest increment between potatoes and lupins, the lowest between rows of *Calamagrostis*; Lime seedlings grew best on bare (weeded) soil, less well in potatoes, and least in lupins; for Pine, the sequence was: bare soil, *Calamagrostis*, oats, potatoes, lupins.

1622. Krečmer, V. O metodice výzkumu a některých problémech vlivu krycích kultur na prostředi a růst semenáčků dřevin v prvním roce života. **[Methods of research on, and some problems of, the influence of cover crops on the environment and growth of tree seedlings in their first year.]** *Práce výzkum. Úst. lesn. ČSR* No. 3, 1953 (71–148). 114 refs. [Cz.cz.russ.g.]

Experiments were made in 1952 with seedlings of *Quercus cerris*, *Acer platanoides*, *A. pseudoplatanus*, *A. negundo* and *Fraxinus excelsior*, sown in full-grown crops of (1) barley, (2) wheat, (3) oats, (4) forest rye and on (5) fallow with scattered weeds, and (6) clean weeded fallow. Microclimatic and pedological observations showed that, during hot and dry weather, grain crops (like dense weeds) form an unfavourable environment for forest tree seedlings; (6) is a favourable milieu as regards both microclimate and soil moisture; (5) was more favourable than (1)–(4), and in these crops the denser the growth the worse the conditions.

232.3. Seed, Nursery Practice, Direct Sowing

232.31. *Seed*

See also Nos. 1459, 1951.

1623. Holmes, G. D., and Buscewicz, G. **Forest tree seed investigations.** *Rep. For. Res. For. Comm., Lond. 1952/53*, 1954 (14–7).

Investigations into the reliability of the tetrazolium test continued for a fourth year. It is now clear that it gives consistent and reliable results for Sitka and Norway Spruce, Scots and Corsican Pine, European Larch and Douglas Fir. Results with Japanese Larch have been less satisfactory. Pre-chilling of seed of Douglas Fir and Sitka Spruce has been found to shorten the germination period from 40–50 days to 14 days, provided that moisture is suitably controlled during pre-chilling. Seed-storage investigations have shown that acorns can be stored in moist peat for two years with little loss of viability. Attempts to store Beech mast for more than 18 months have failed. Birch (*Betula verrucosa*) seed can be stored for at least 2 years if placed dry in sealed containers; temperature appears to have no effect on viability in these conditions. Stratification in moist peat was a failure except at temperatures below freezing point. Successful long-term storage of conifer seed requires the seed to be a little below 10% moisture content before sealing up in airtight containers, and best results have been obtained at a constant temperature of 36° F.

1624. Essais de germination. **[Germination tests.]** *Rapp. Inst. nat. Étude agron. Congo belge 1953*, 1954 (124–7). [F.]

Gives for the seed of 17 Yangambi species the month and method of collection, the preparation, seed number/kg., germination data and method and maximum period of storage.

1625. Dementjev, P. I. Nekotorye osobennosti kuljtivirovanija listvennicy sibirskoĭ. **[Some special features in the raising of Siberian Larch.]** *Lesn. Hoz.* 5 (2), 1952 (24–6). [Russ.]

[Cf. *For. Abstr.* 12 (No. 2909).] The first half of August is the best time for collecting Siberian Larch seed in the Moscow region; the cones are spread thinly on a floor under cover for 2 weeks, and then dried in the sun, 3 days being sufficient to cause them to shed the seed. In December the seed is put into muslin bags, sufficiently large for the seed to form a thin layer, and buried under the snow. At sowing time in spring, seed so stored was moist but had not germinated; it germinated 7 days before, and yielded 80% more seedlings than, seed stored dry. At least up to 7 years old, and probably even later, Siberian Larch can be cut back to the stump and will coppice; this treatment is beneficial to weak seedlings and should be carried out as early in the season as possible—in any case not later than the end of June. Plants > 2 years old are liable to form several coppice shoots, of which all but one should be removed. The treatment appears to accelerate height growth.

1626. Beracko, S. Pestovat' lipu malolistú z predčasne zbieraného semena? **[Growing of *Tilia cordata* from prematurely collected seeds.]** *Les, Bratislava* 1 (7/8), 1954 (57). [Slovak.]

The author recommends collection of the seeds in the second half of September and soaking them in water at 50° C. for 3 days, after which they are sown in the nursery and the beds covered with 3–5 cm. of litter. In the spring the litter is removed. The seedlings are said to attain a height of 15–20 cm. by autumn, when they can be transplanted; 400,000 seedlings were produced by this method in 1952–53.

1627. Farský, O., Skýva, B., and Piškula, F. O zbere a vysievaní semena lipy malolistej. **[Collection and sowing of *Tilia cordata* seed.]** *Les, Bratislava* 1 (9), 1954 (5–9). [Slovak.]

Seed of *T. cordata* was sown on 1-sq. m. plots in a nursery in the Křtiny forest range [Slovakia] at weekly intervals between 8 Sept. and 10 Nov., 1947. The seed was collected from 3 trees, bulked and sown on the same day; the soil was fairly moist. The seed was either 'milk-ripe' (8 Sept.), 'wax-ripe', or 'hard-ripe' (10 Nov.). It was sown in strips 2 cm. wide and covered with 2 cm. of moistened compost. Germination occurred in the last week of April, 1948. Seed collected before 15 Sept. yielded only a few seedlings; the quickest germination was observed with seed sown between 15 and 29 Sept. The later seed was sown after 29 Sept. the fewer seedlings it yielded, and no seedlings were obtained from seed sown after 20 Oct. The experiment was repeated between 4 and 25 Sept., 1948, using seed from trees of widely different provenance; best results were obtained with seeds sown on 25 Sept.

1628. Bejdl, R. Třešeň, cílová dřevina blizké budoucnosti. **[*Prunus avium*, the tree of the future.]** *Lesn. Práce* 33 (8), 1954 (354–7). [Cz.]

Gives the author's own experience, gained in a large nursery near Mlada Boleslav (Bohemia). Fully mature fruits are freed from pulp, cleaned and stratified in river sand; during summer heat, the seeds are inspected frequently. They are sometimes sown in autumn, but mainly in early spring, as soon as the soil in the nursery begins to dry out. A hundred kg. of fruit gives 15–18 kg. clean seed; 1 kg. seed yields ca. 300 seedlings. The seed is machine sown, 5 cm. deep, in well cultivated soil with 33 cm. between drills. At the end of the first year the seedlings are ca. 40 cm. high, 8 mm. diam. at root collar, and ready for transplanting. Since 1951, ca. 30,000 *P. avium* seedlings have been planted in stands near the nursery. Measurements made in 2 experimental plots (20 × 20 m.), where 1-year seedlings were planted under Hornbeam/Oak/Birch/Spruce at 1·5 × 1·5 and 1 × 1 m. spacing, gave the following results: mean height increment in the first year after transplanting was 28 cm., and in the second year 34 cm.; for the plants in the *centre* of the plots the figures were much higher, ca. 33, and 75 cm., respectively; 3·55% of the plants died during the winter, one year after transplanting; a spacing of 1 × 1 m. is preferable to 1·5 × 1·5 m. The plants require a fairly good soil with enough Ca; they are sensitive to late frosts. The only insect pests observed were aphids. Protection from browsing is important. [Cf. *For. Abstr.* 14 (No. 2163).]

232.311. Seed Production (Seed Years, Seed Crops; Seed Orchards and Methods of Inducing Seed Production)

See also Nos. 1419, 1431, 1433, 1776, 2073.

1629. Witt, L. A fenyömagtermelö állományok törzskönyvezésének eddigi tanulságai. **[The registration of conifer stands for seed production.]** *Erdö* 2 (4), 1953 (336–41, 391, 395). [Hu.russ.g.]

For Austrian and Scots Pine, ecotypes should be chosen that have the vitality to thrive in the most adverse circumstances; otherwise for all conifers, growth and form are the most important factors. Morphological features alone are not reliable criteria for inland varieties of Scots Pine. Within every region, certain stands must be established for seed production, with plants raised from seed of élite trees and having proper registration and adequately trained personnel.

232.312. Seed Collection, Extraction and Grading (including Seed Weight)

See also Nos. 1624–7, 1661–2.

1630. Eliason, E. J., and Hill, J. **Specific gravity as a test for cone ripeness with Red Pine.** *Tree Plant. Notes* No. 17, 1954 (1–4).

Optimum storage quality was found in *Pinus resinosa* seed from cones collected when their sp. gr. had dropped to 0·88.

1631. Gouffon, C. L., and Lehto, T. V. **Ratio of rough cones to clean seed [in *Pinus echinata, P. taeda, P. strobus* and *P. virginiana*].** *Tree Plant. Notes* No. 17, 1954 (5–6).

1632. Hebb, E. A. **How to open Pond Pine cones.** *J. For.* 52 (10), 1954 (770).

Experiments with different methods of opening *Pinus serotina* cones showed that the most effective treatment is to dip the cones in boiling water for a moment. Opening is accompanied by sharp, crackling noises and if the cones are removed when crackling starts they will not become soaked and seed can be extracted easily in a day or two.

232.314. Seed Purchase, Trade and Transport

See No. 1629.

232.315. Seed Storage and Treatment

See also Nos. 1433, 1623–5, 1662, 1668, 1762.

1633. Huss, E. Undersökningar över vattenhaltens betydelse för barrträdsfröets kvalitet vid förvaring. **[Studies on the importance of water content for the storage of conifer seed.]** *Medd. SkogsforsknInst., Stockh.* 44 (7), 1954. pp. 60. 16 refs. [Sw.sw.e.] Price *Kr.*3.

Parallel studies were made on Scots Pine seed, having either good or poor germinative capacity, of N. Swedish provenance from trees of the same age. The seeds were stored at — 5, 5, 20 and 22° C. for 1 to 18 months in a desiccator or in flasks. Their moisture contents are expressed as a % of their dry weight. The effects of storage conditions were assessed by the germinability after storage, seedling weight, and the results of examining sowings in the open over 3 years. Results are shown in graphs and tables with English legends. The general conclusion is that for both good and poor seed the moisture content during storage is the primary factor affecting germination, particularly over long storage periods and for seed stored at plus temperatures.

1634. Kopeczky, F. A nyármagvak csírázásélettani vizsgálata. **[Investigations on the physiology of germination of Poplar seeds.]** *Erdészeti Kutatások*

Budapest 1954 (1), (6–17). [Hu.] From *abstr.* in *Hung. agric. Rev.* 3 (2), 1954 (8). [E.] C.G.B.

Poplar seed [species not named] stored in a desiccator (with $CaCl_2$) placed in an ice-box at 0·5° C., showed only slight decrease of germinative capacity from the initial 98 to 94 % after 5 months.

1635. McComb, A. L., and Lovestead, H. S. **Viability of Cottonwood [*Populus deltoides*] seeds in relation to storage temperatures and humidities.** *Tree Plant. Notes* No. 17, 1954 (9–11).

Experiments showed that optimum conditions of storage were a temperature of 10° F. with relative humidity 25 %. The data suggest that at low temperatures humidity is a critical factor.

1636. Barton, L. V. **Effect of presoaking on dormancy of seeds.** *Contr. Boyce Thompson Inst.* 17 (7), 1954 (435–8). 4 refs.

Seeds of *Pyrus malus*, *Pinus contorta*, *P. ponderosa* and *Berberis thunbergii* were soaked in different amounts of tapwater at 5 and at 20° C. for different periods, before stratification. None of the treatments hastened germination.

1637. Dabral, S. N., and Kadambi, K. **Preliminary note on artificial ripening of the immature fruits of *Broussonetia papyrifera*, Vent. (The Paper Mulberry tree.)** *Indian For.* 80 (11), 1954 (724–6 + 1 plate + 1 gph.). 3 refs.

Both germinative capacity and germinative vigour of the seeds were improved by treating the unripe fruit with ethylene gas in a concentration of 1 cu. ft. gas/1000 cu. ft. air at 65° F. for 48 hours.

1638. Sato, K., and Shoji, T. **[On disinfection and hastening germination of Black Locust seeds.]** *J. Jap. For. Soc.* 36 (9), 1954 (244–7). 8 refs. [Jap.e.]

(1) *Colletotrichum* sp., *Fusarium* spp., *Cladosporium* and bacteria were isolated from the seeds, the first two being dormant in the seed tissues as well as adhering to the surfaces. Seeds and seedlings were attacked by the organisms and the germination % was decreased. (2) Treatment with boiling water was most effective in hastening germination, and soaking in water at 70° C. for 5 min. was also effective. These treatments were not satisfactory in preventing fungus attack. (3) Disinfection with Ceresan and Uspulan, especially the former, were very effective. (4) Combined treatment with hot water and Ceresan had a good effect on germination, but the seed surface must be dry at the time of dusting with the fungicide; dusting the wet seeds with Ceresan, after the hot water treatment, reduced germination. [Tables and photographs have English legends.] *From authors' summary.*

1639. Sato, K., and Nishina, Y. **Effects of fast neutrons on forest tree seeds. II. Relations between the intensities of irradiations and the germination of seeds [and] the growth of seedlings of *Pinus densiflora*.** *Science Bulletin, Faculty of Agriculture, Kyushu University* 13 (1/4), 1951 (238–42 + 1 plate). 5 refs. [E.e.] L.S.

Dry seeds and seeds soaked in water for 1 or 3 days were irradiated for 5 to 120 min. using (*a*) weak, (*b*) medium, and (*c*) strong treatments, i.e. at distances of 10, 7 and 3 cm. respectively from the target. With all treatments, germination was retarded by increasing exposure periods and the % germination, 7 days after germination began, decreased with increasing lengths of exposure and intensity of treatment. However, for certain combinations of exposure time and treatment, (*a*) and (*b*) 10, 15, 30, 60 min.; and (*c*) 5, 10 and 15 min. for dry seeds; and (*a*) 10 and 15 min. for seeds soaked for 1 day, germination % was higher than in the controls. Survivals nearly 6 months after sowing were higher for seedlings from treated seeds for some doses, (*a*) 30, (*b*) 5 and 10 and (*c*) 5 for seeds soaked for 1 day; and (*a*) 10 and 15, (*b*) 15 and (*c*) 5 for seeds soaked for 3 days, than for controls; above these limits survival decreased with increasing doses and was nil for the doses (*b*) 120, (*c*) 60 and 120. Seedling growth from seeds treated with (*a*) and (*b*) 5, 10, 15, 30 and 60, (*c*) 5, 10, 15 and 30 for dry seeds and (*a*) 10 for seeds soaked for 3 days, was above that of the controls; outside these limits height growth generally decreased with increasing doses.

232.318. Seed Testing. Germination Tests. Seed Quality

See also Nos. 1522, 1527, 1623–4.

1640. Sarnavka, R. Intenzitet klijavosti kao efektivna vrijednost proklijalih sjemena. **[Germinative 'intensity' as an effective measure of germinability.]** *Šum. List* 78 (7; 8), 1954 (281–301; 345–64). [Croat.e.g.]

Discusses germinative energy and related concepts and proposes the new concept of germinative 'intensity' defined as the product of the number of germinated seeds and the mean period of germination. If the numbers of seeds [in relation to 100 seeds taken for the test] that germinated on particular days (the daily germination %) are assumed to play the role of (parallel) forces applied to points on an axis, corresponding to these particular days, then the germinative energy can be likened to the static momentum which can also be determined by the usual methods of mechanics. The time values (corresponding to the arm of force in statics) are reckoned from the last day of observation backwards, i.e. the number of seeds which germinated on this day is multiplied by 0, that of the preceding day by 1, that of the day before by 2, and so on. The sum of the individual products is the germinative intensity measured in 'seed-days'. The calculation and graphical evaluation of germinative intensity are described in detail. This value can be determined for any desired period during the course of germination.

1641. Iwakawa, M., and Kotani, S. **[Effect of coloured light on the germination of Akamatsu (*Pinus densiflora*) and Kuromatsu (*Pinus thunbergii*).]** *J. Jap. For. Soc.* 36 (9), 1954 (249–52). 2 refs. [Jap.jap.e.]

[Cf. *For. Abstr.* 15 (No. 3473).] Seeds of both species continuously exposed to electric light through coloured glass filters for 4 weeks germinated better in full and in red light (6500 Å) than in green (5350 Å) or blue (4600 Å) light or in darkness. In *P. densiflora* germination rate was lowest in green and in *P. thunbergii* in blue light. No consistent

difference was found in germination under coloured light of seeds of the two species collected in 5 different localities. *From authors' summary.*

1642. ROHMEDER, M. Keimung und Keimprüfung von Schwarzkiefernsamen. **[Germination and testing of *Pinus nigra* var. *austriaca* seeds.]** *Forstwiss. Cbl.* 73 (5/6), 1954 (175–9). 8 refs. [G.g.]

Fresh, sound, good-quality seed of Austrian Pine has a germinative capacity > 90%. Such seed germinates about equally well in a germinator at a constant temperature of 25° C., or in a Rodewald apparatus at alternating temperatures of 20–25° C. The final germination % for old, less viable seed is sometimes increased by alternating temperatures; but the values for germinative energy (period 7 days) are higher with constant temperature. Parallel tests with both kinds of apparatus are therefore recommended. A test period of 21 days is sufficient (instead of the 42 days hitherto used) for determining the germinative capacity of this species. The period for germinative-energy determination should be 7 days; seed giving equal final germination %s may differ in germinative energy.

1643. MUGNAINI, C. Ricerche sulla germinazione del pino marittimo. **[Studies of the germination of *Pinus pinaster*.]** *Ital. for. mont.* 9 (4), 1954 (214–7). 5 refs. [It.it.f.]

Optimum temperature was found to be 20° C. with moisture of the medium (sand) at ca. 20%. Pre-soaking of seed for 30–90 hours in water at 3° C. stimulated germination, but if treatment was continued beyond 12 days it gave negative results.

1644. BIENTJES, W. **The effects of temperature, seed moisture, and stratification on the germination behaviour of Western Hemlock [*Tsuga heterophylla*] seed.** *Res. Note U.B.C. For. Club* No. 11, 1954. pp. 7. 5 refs.

As a result of this study, the following procedure is recommended for germination tests: (1) soaking for 30–35 hours in tapwater at room temperature; (2) surface drying followed by 'naked stratification' [without medium] at 33° F. in containers with loose covers or stoppers for ca. 8 weeks; (3) germination will be complete after ca. 21 days of incubation at a temperature of 20° C. [Cf. *For. Abstr.* 16 (No. 395).]

1645. ZABOROVSKIĬ, E. P. K metodike proraščivanija želudeĭ. **[Rapid germination tests for acorns.]** *Lesn. Hoz.* 5 (1), 1952 (61–2). [Russ.]

By cutting off the major part of the cotyledons and placing the portions containing the radicle and plumule in a germinator (narrow end touching moist filter paper) kept at a temperature varying from 36° (daytime) to 24° C. (evening) the germinative capacity can be obtained on the 10th day with untreated acorns or on the 7th day for acorns soaked 2 hours in 5% $CaCl_2$ solution and rinsed in water.

1646. **The rate of germination of large lots of seed [of *Elaeis guineensis*].** *J. W. Afr. Inst. Oil Palm Res.* No. 2, 1954 (138–40). 3 refs. E.M.B.

Average results of germination tests with large numbers of seeds over 3 years gave 20% germination in the first month, 50% by the 4th month, and a maximum of nearly 60% by the 7th month. It is recommended that seed should be sown early in September, which gives 4 clear months for germination. It is stressed that individual lots of seed may germinate much faster or slower than the average.

232.32. *Plant Rearing. Nursery Practice*

See also Nos. 1492, 1601, 1628, 2511.

1647. KRÜSSMANN, G. Die Baumschule. **[Nursery practice.]** Paul Parey, Lindenstrasse 44–47, Berlin SW 68. 2nd ed. (rev.), 1954. pp. viii + 559. Many refs. [G.]. Price *DM.*48.

A comprehensive, richly illustrated manual covering nursery practice in general and, in detail, the woody species of horticultural and forestry interest grown in Germany. The work is divided into two parts: (1) General (pp. 1–206), containing a review of the development and present situation of tree-nurseries in some of the more important countries; an account of the factors influencing choice of site, and of the installations, equipment, tools and machines used; the technique of rearing nursery stock (propagation methods, use of growth substances and of plastics, culture of plants, lifting, packing and despatch); diseases and pests and their control. (2) Special (pp. 207–513), which deals in alphabetical order with the propagation and culture of the individual genera and species. Appendixes cover regulations, agreements etc. relating to nursery stock; a list of trade and other associations (international, German and other) of interest to the nurseryman; a list of German collections of woody species; and equivalents in 13 languages for 30 important nursery terms. There are indexes to authors quoted and to subjects.

1648. YLI-VAKKURI, P. Maamme taimitarhat ja niiden taimituotanto. **[Finland's nurseries and their seedling output.]** *Metsät. Aikak.* 1954 (11), (435–8). 4 refs. [Fi.e.]

Tabulated data for 1903 to 1953.

1649. KĘDZIERSKI, Z. Próba określenia produkcyjności rozsadników gospodarczych. **[A tentative determination of nursery productivity.]** *Sylwan* 98 (1), 1954 (58–63). 2 refs. [Pol.]

A 'productivity index' for seedlings is suggested viz. $P = W \times U_1/100$ where W is the plant % for the seed used and U_1 the number of 1st-class seedlings as a % of total seedlings [cf. *For. Abstr.* 15 (No. 3525)]. Values for P for 1-year Oak and Pine seedlings (using data from 20 nurseries of each species) point to the advisability of basing the calculations on larger populations.

1650. URQUHART, B. **Mechanization of nursery work and scrub clearance. [With discussion.]** *Quart. J. For.* 48 (4), 1954 (251–61 + 8 photos). 7 refs.

Discusses general principles and includes notes, with photographs, on the Ferguson Steerage Hoe, Ferguson tractor fitted with rotovator, Ledmore root-pruner, Gunn plant lifter, Holland transplanter, Talbot lining-out plough, Ransome Vibra hoe, and Allen Autoscythe. In general, it is considered that mechanization will reduce costs in the nursery but not in scrub clearance.

1651. MATOUŠEK, P. Pěstování jednoletých listnatých sazenic v malých lesních školkách. **[Rearing one-year broadleaved plants in small forest nurseries.]** *Práce výzkum. Úst. lesn. ČSR* No. 4, 1954 (193–212 + 1 tbl.). 8 refs. [Cz.russ.g.]

Experiments in 1952 in 3 nurseries (alt. 360–370 m., forested hilly region, loamy soil with limestone substratum) showed that the optimum nursery area for growing one-year-old broadleaved plants in Czechoslovakia is 0·2–1 ha. Sowing in 10-cm. strips with 10-cm. interspaces is recommended, using stratified seeds of local provenance.

232.322. Preparation and Treatment of Soil, including Maintenance of Fertility

See also Nos. 1897, 2307–10.

1652. FAULKNER, R., and HOLMES, G. D. **Experimental work in nurseries.** *Rep. For. Res. For. Comm., Lond. 1952/53*, 1954 (17–31).

A large-scale steam sterilization experiment confirmed the 1951 work [cf. *For. Abstr.* 15 (No. 1287)] and again emphasized the superiority of steam over formalin as a soil-sterilizing agent, but the trouble and cost rule it out in comparison with chemical methods. 'D-D' [dichloropropene/dichloropropane mixture] proved less effective than formalin as a soil sterilizer and its second-year residual effect was negligible.

Placement of P and K below band-sown seed produced taller seedlings than broadcasting of fertilizers before broadcasting seed. Broadcasting of seed, however, gave a much higher yield of seedlings per lb. of seed. An experiment comparing the application of P fertilizers 16, 5, and 2 weeks before sowing and on the date of sowing, indicated that applications 2–16 weeks before sowing are most successful. Applications at the time of sowing, particularly where the fertilizers are left in contact with the seed, reduced the speed of germination and the final yield of seedlings. Experiments comparing methods and times of applying nitrochalk, showed that applying ⅓ of the total (4½ cwt./acre) before sowing, with two subsequent top dressings in August, or one in July and one in August, produced very slightly larger plants than application in two top dressings in July. [Cf. *For. Abstr.* 15 (No. 3484).]

Compaction of seedbeds with a 3½-cwt. roller and light rolling after sowing, produced slightly earlier germination and an increase in numbers of plants, compared with lighter compaction and no rolling after sowing. A covering of hessian over seed sown below a grit cover slightly increased the speed of germination, the height of seedlings, and the yield of plants. 'Krilium' soil conditioner applied to seedbeds made up on heavy soil reduced the speed of germination, and had no effect on height growth or seedling yields. There was some indication that it had slightly reduced frost lift.

A successful attempt was made to raise 3 crops of Sitka Spruce seedlings in one year in the same heated frame. Seedlings were grown in soil heated by electrical bottom heat. Plants were hardened off out of doors, and a 3-in. cover of Spruce branches, 6 in. above the seedlings, proved satisfactory even in February. The use of night illumination with average intensities of ca. 4 and 15 ft.-candles produced slight responses in height growth in Scots Pine and considerable responses in Norway and Sitka Spruce growing in frames with the soil temperature maintained at 60° F.

Root pruning of 1-year-old Scots Pine and Japanese Larch at a depth of 3 in. in the second year, led to a lower mean height of seedlings, a greater root/shoot ratio by weight, and more root fibre, when compared with unpruned seedlings; but comparable 1 + 1 transplants were even shorter in height and had even more root fibre. Experiments to determine the effect of very early lining-out indicate that for Scots Pine and Sitka Spruce, lining-out in July and June can be highly successful if weather and soil conditions are suitable.

One-year seedlings of Scots Pine, Japanese Larch, Douglas Fir, and Sitka Spruce were sprayed with maleic hydrazide diluted in water to concentrations of 0·05, 0·1 and 0·2%. The object was to determine whether the chemical would retard the date of flushing and so reduce the amount of growth in seedlings which are required to remain for a second year. Applications were made in spring, when the buds began to swell. Treatment had no effect on date of flushing but reduced growth of all species in one of the two tests.

1653. GARRETT, S. D. **Partial sterilisation of soil for disease control.** *Rep. For. Res. For. Comm., Lond. 1952/53*, 1954 (100–1). 4 refs.

In continuation of previous work [cf. *For. Abstr.* 14 (No. 2169)], which showed that *Trichoderma viride* becomes the dominant fungus in treated soils for 18 months after treatment with formalin, a study was made of the behaviour of *Pythium ultimum* when re-introduced into formalin-treated soils after the formalin vapour has passed off, and the new fungus flora is established. Contrary to expectation, *P. ultimum* was found to be most active and to survive longest in those soils (acid soils receiving full-strength formalin) in which the dominance of *T. viride* was most pronounced. Conversely, *P. ultimum* tended to be least aggressive in untreated soils with the original microflora. Possible reasons for this are discussed. There is evidence that *P. ultimum* is particularly sensitive to the antagonism and competition of certain soil bacteria, and especially to those of certain gram-positive bacteria. These bacteria seem to be particularly sensitive to formalin treatment of soil and to the antagonistic effects of *T. viride* that follow it. It is clear that strict precautions must be maintained against recontamination of partially sterilized soil by pathogenic fungi, at least until the earlier phases of microfloral recolonization are over.

1654. MORRIS, L. G. **The steam sterilizing of soil [in glasshouses]: experiments with fine soil.** *Rep. nat. Inst. agric. Engng., Silsoe* No. 14 (2nd ed. rev.) 1954. pp. 32. 8 refs.

1655. MORRIS, L. G. **The steam sterilizing of soil [in glasshouses]: the application of research to practice.** *Rep. nat. Inst. agric. Engng., Silsoe* No. 24, 1954. pp. 22. 17 refs.

1656. TRIBUNSKAJA, A. JA. Vynosi azota i fosfora sejancami sosny na seryh lesnyh počvah. **[Uptakes of N and P by Scots Pine seedlings on grey forest soils.]** *Dokl. Akad. Nauk SSSR* 97 (5), 1954 (927–30). 5 refs. [Russ.] A.P.B.

Tabulates and discusses the results of studies of first- and second-year seedlings under varied conditions of nutrient and water supply, and differing in mycorrhizal development, made by the Urals Forest Research Institute on podzolic clay-loams of a type widespread in Sverdlovsk, poor in P and humus. (1) Nursery trials of stable manure or compost (1–2·5 kg./sq. m.) both with superphosphate (0·025–0·05 kg./sq. m.), with or without 4–5 waterings in the course of the summer, showed that, at least in the dry years (1952–53) concerned, the favourable effect of watering, as judged by dry weight per plant and N content, far outweighed that of fertilizing. Seedlings given compost + superphosphate and watered were the largest, being 3–4 times as large as, and having over 4 times the dry weight and 1·6 times the N content of, controls at the end of their first growing season (6 months old). Mycorrhizae were most abundant on plants watered and fertilized. (2) Unfertilized, unwatered seedlings with abundant mycorrhiza had an N content of 2·29% (based on dry weight) compared with 1·63% for the controls in (1), of the same age and size but with poor mycorrhizal development. Their P_2O_5 content [not indicated for (1)] was 0·615%. (3) In a comparison of two lots of 100 plants each, at the end of their second growing season: (*a*) untreated nursery stock with abundant mycorrhiza, and (*b*) 'average-type' wildings lifted from Pine forest of site quality 3, (*a*) showed 25·1 mg. N and 3·5 mg. P_2O_5 and (*b*) 13·4 and 5·7 mg. respectively, per plant. (4) At the end of their first growing season 100 seedlings each of (*c*) plants with many mycorrhizae and (*d*) plants with few mycorrhizae, but all as uniform as possible in root development, were lifted, shaken cautiously to remove loose soil, and the roots with adhering soil steeped for 1 hour in water, after which the water was analysed for NH_4-N and PO_4-P, as an indication of the amounts of these present in the rhizosphere. Water from (*c*) contained 3·7 mg. NH_4-N and 1·8 mg. PO_4-P, and that from (*d*) 1·6 mg. of each substance.

1657. VAARTAJA, O. **Correction of chlorosis in [White] Spruce seed beds.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (5), 1954 (2).

Further experiments confirm the earlier finding [cf. *For. Abstr.* 15 (No. 3485)] of the superiority of applications of N fertilizer in liquid form to seedbeds after emergence, rather than before sowing. Repeated treatment is necessary in dense seedling stands. Shading the beds with screens decreased chlorosis, though to a less degree than fertilizer treatment. This effect of shade is not yet understood.

232.323. Sowing and Covering

See also Nos. 1626–8, 1652, 1706.

1658. DOCENKO, A. P. Èkonomičeskiĭ èffekt širokorjadnyh posevov v pitomnikah. **[Economic effect of broad drill sowings in nurseries.]** *Lesn. Hoz.* 5 (2), 1952 (91–4). [Russ.]

Experiments in the Kishen'kov nurseries with sowings of Scots Pine (totalling 4·2 ha.) in drills (*a*) 8, (*b*) 4, or (*c*) 2 cm. wide, showed a considerably higher yield of seedlings from the 8-cm. drills. The numbers of seedlings per running metre were: (*a*) 311, (*b*) 191 and (*c*) 139, the respective %s of first-grade seedlings being 40, 29 and 21%, and the amounts of seed used per ha., 120, 100 and 80 kg. Apart from width, the main and most important feature of the 8-cm. drills was that the soil at the bottom of these was firmed; this made possible closer contact between seed and soil, and the compact soil remained moister owing to the capillary rise of moisture; the seed covering was loose, making it easier for the seedlings to come through. The sowings were neither watered nor sheltered but received a dressing of 150 kg. of superphosphate and 100 kg. of wood ash per ha. [before sowing?]. In 1951 ca. 7 million Pine seedlings were raised in the broad drills from an area of 1·53 ha; the method is applicable both for coniferous and broadleaved seed and reduces the cost of seedling production almost by half.

1659. FABRICIUS, L. Versuch zur Klärung der Frage: Hat der Mond Einfluss auf die Keimung und erstjährige Entwicklung von Fichten und Kiefernsaaten? **[Has the moon any influence on germination and first-year development of Spruce and Pine sowings?]** *Forstwiss. Cbl.* 73 (5/6), 1954 (142–51). [G.]

Series of sowings were made at 2-day intervals during the waxing and waning of the moon. At the end of the growing season the plants in each series were lifted, cleaned, counted and weighed, and mean weight per 100 plants was calculated. Three sets of trials were made: at Anzing, Halstenbek (in 1950 and 1953) and Grafrath. The results, shown in graphs, made it clear that the moon had no influence on the growth of seedlings. Weather at sowing time and during early growth was much the most important factor influencing their development.

1660. MARCET, E. Un procédé pour mieux réussir les semis de tremble. **[An improved method of sowing Aspen [*Populus tremula*] seed.]** *Schweiz. Z. Forstw.* 105 (11), 1954 (621–5). [F.g.] [Eidgenössische Technische Hochschule, Zürich.]

After much experiment the following procedure has been evolved, which gives very good results. Troughs are made watertight by plugging the drainage holes, and the bottoms are then covered with a layer of fine gravel on which, in the middle of the trough, is set a No. 6 or 8 flowerpot. The troughs are then two-thirds filled with 'Terralite' [vermiculite?] which is watered to saturation point and then covered with a layer of compressed peat, cut as thin as possible and soaked for 24 hours before application, which forms the seedbed. Since practically every seed germinates there is no need to sow broadcast, and seed are placed on the peat at regular intervals of 1·5–2 cm. Water is then poured into the flowerpot until its bottom remains covered; neither the pot nor the trough should ever be filled with water. The troughs are then placed in a sheltered position with plenty of light, preferably

in a greenhouse, and need no further attention beyond daily inspection of the water level in the pots and the addition of more water when necessary. The addition of a little liquid fertilizer such as the Swedish 'Blomstra' (containing growth regulators and trace elements) is beneficial. At the end of 6–8 weeks the seedlings will be 10–15 cm. high, with well ramified roots and ready for planting out. This method is much superior to sowing in the open and gives practically 100% success.

1661. Jirkovský, V. Zkušenosti s pěstováním osiky ze semene. [**Raising Aspen from seed.**] *Lesn. Práce* 33 (7), 1954 (305–10). [Cz.]

Describes Czechoslovakian experience of recent years in the collection and cleaning of Aspen seed, and the raising of Aspen seedlings in nurseries. The catkins were collected in late April and early May, when the capsules were starting to burst and the first white 'cotton' appeared; great care was taken not to pluck damaged catkins which might open prematurely. The seeds with cotton were first passed through a sieve of 2½–3 mm. mesh [ca. 8–10 mesh], and then through bolting cloth; 10 kg. of catkins yielded ca. 1 kg. of clean seed of 90% germinative capacity. The nursery soil was cultivated in autumn or early in spring, so as to allow enough time for settling. Good weeding was of great importance. Very good results were obtained when brushwood was spread and burned on the beds a fortnight before sowing. The soil was watered before and after sowing. The seed was mixed with sand or wood ash in the proportion 1/200 (later even 1/500, in view of the very good germination), and sown in drills. Young seedlings were partially shaded with branches of conifers etc., and the soil was regularly loosened. The seedlings were then thinned to a spacing of 3–6 cm. 'Black mould' [causal agent not specified] on seedlings was controlled by spraying with Cu preparations ($CuSO_4$ should be applied in the evening), and *Melasoma tremulae* attacks by dusting with 'Dynocide' [DDT]. In one of the nurseries, ca. 400,000 Aspen seedlings fit for transplanting (height 30–150 cm.) were obtained from 0·2 ha.

1662. Lopez, M. P. **Study of some factors controlling germination of Anabiong (*Trema orientalis* Linn. Blume) seeds.** *Philipp. J. For.* 9 (1/4), 1953 (1954), (79–105 + 6 plates). 4 refs.

Factors investigated were sunlight, temperature, mulching, depth of sowing, and methods of cleaning the seed from the juicy pericarp. Stratification in leaf litter, keeping the litter moist, is a cheap and easy way of germinating seeds. Rodents and ants can be kept away from seed flats by surrounding the flats with sacks soaked in creosote. Maceration and washing in tapwater is the cheapest method of extraction.

232.324. Transplanting and Lining Out, including Grading of Seedlings

See also No. 1652.

1663. Ein neues Rodegerät. [**A new implement for lifting trees [in the nursery].**] *Deutsche Baumschule, Aachen* 5 (6), 1953 (164–6). [G.] E.M.B.

Consists essentially of 2 bars mounted on wheels and carrying a heavy U-shaped share. Guided by 2 operators, it is pulled down the rows by cables and winch which also control the depth at which the share works. The implement is patented to Dr. Ernst Matula and Hubert Patek, Wilbering bei Linz, Donau.

1664. Saharov, I. Zelenye pikirovki sejancev drevesno-kustarnikovyh porod. [**Pricking-out seedlings of trees and shrubs.**] *Lesn. Hoz.* 5 (4), 1952 (91–3). [Russ.]

Describes and illustrates a special tool for pricking out, consisting of two boards (1 m. long, 7–8 cm. wide and 2 cm. thick), the upper board having pegs 10 cm. long and 3 cm. in diameter at base, passing through corresponding holes in the lower board. These pegs make suitable holes in the bed; a screw device adjusts the distance between the two boards so that the pegs project to give the desired depth of hole.

1665. Isačenko, H. M. Standartizacija sejancev drevesno-kustarnikovyh porod. [**Standardization of nursery stock of trees and shrubs [in the USSR].**] *Lesn. Hoz.* 5 (1), 1952 (26–32). [Russ.]

A warning against the extension to the rest of the USSR of the 1946 standard for nursery stock intended for shelterbelts in the steppes of the S. and S.E. of European Russia. The article is based on the interpretation of data from trials laid out in 1939–40 by the All-Union Forestry Research Institute (VNIILH) in 40 leshoz of the forest and forest-steppe zone.

232.325. Tending (in both Seedbeds and Transplant Beds)

See also Nos. 1656, 2309–10.

1666. **Plastic pipes water Pine seedlings.** *Naval Stores Rev.* 64 (5), 1954 (13).

More than 5 miles of Tenite butyrate plastic pipe has recently been installed by the Florida Forest Service over a nursery area of ca. 30 acres near Olustee, Florida. The pipe, 1, 1½, and 2 in. in diam., was buried to a depth of 2 ft. after being joined together with slip sleeve couplings and tee joints alternately, plus a solvent cement. Galvanized metal risers of ¾ in. diam. and 7 ft. long were screwed into threader adapter plugs in the joints to provide rigid upright outlets on which were mounted revolving sprayheads.

1667. **Nursery research—Hoop Pine [*Araucaria cunninghamii*].** *Rep. For. Comm. N.S.W. 1951/52*, 1954 (10).

Research to date has shown the effectiveness of $NaClO_3$ as a pre-emergence spray to reduce weed growth on nursery beds of Hoop Pine during the first 3 months after sowing. Earlier experiments with selective weedkillers were not successful.

A number of experiments on the technique of tubing indicated the hardiness of Hoop Pine in the nursery. It was found that the retention of only one lateral root was sufficient for the establishment of the seedling in a tube. Provided that seedlings are tubed in moist soil, one watering within 24 hours of tubing is sufficient to ensure establishment in the

tube. A series of experiments aimed at reducing losses after tubing, indicated that exposure to frost before tubing will cause 'dead topping' but not necessarily death. Soil temperature in the tube (either much higher or much lower than normal soil temperature) is the greatest cause of losses of tubed seedlings. These can be avoided by tubing either early (Feb.–March) or late (Oct.) or by burying the tubed stock to the full depth of the tube after tubing during the normal season (July).

232.326. Salvage of Overgrown Seedlings and Transplants. Root Pruning etc.

See Nos. 1625, 1652.

232.327. Protection Measures in Nurseries

See also Nos. 1433, 1661–2, 1677–8, 1887 *et seq.*

1668. IBBERSON, J. E. **Chemically treated seed shows promise in forest nursery work.** *Tree Plant. Notes* No. 17, 1954 (7–8).

Seed of *Tsuga canadensis*, *Picea abies*, and *Pinus resinosa* was thoroughly mixed with tetramethylthiuram disulphide (thiram) in powder form at a rate of ½ teaspoonful per 1 lb. of seed before sowing. At the end of the first growing season, the number of seedlings from treated seed for the 3 species was 43%, 47% and 17% respectively above that from untreated controls.

232.328. Vegetative Propagation

See also Nos. 1419, 1507, 1697, 1715, 1926.

1669. WELLS, J. S. **Propagating tools.** *Amer. Nurserym.* 100 (7), 1954 (14–5, 49–53).

Notes (with photographs) on choice and maintenance of knives, a razor-blade device for wounding the base of cuttings, a machine with two blades for cutting scions with two exactly parallel cuts, and a German potting machine—the Erdprinz.

1670. LOMBARTS, J. Bouturer avec humidification. **[Propagation by cuttings in a humidified atmosphere.]** *Z. Forstgenet.* 3 (5), 1954 (104–5). [F.g.]

Brief notes on the use of a continuous mist spray, with illustrations from experiments at Wageningen. [Cf. *For. Abstr.* 16 (No. 407).]

1671. HESS, C. E., and SNYDER, W. E. **Interrupted mist found superior to constant mist in tests with cuttings.** *Amer. Nurserym.* 100 (12), 1954 (11–2, 82).

Experiments show that cuttings treated with interrupted mist [electronically controlled or controlled by a time clock] root faster and develop a better root system, because of the higher mean temperature in the greenhouse. Another advantage is the elimination of the drainage problem and reduced consumption of water. The 'electronic leaf', a device for regulating mist, is illustrated and described. [Cf. *For. Abstr.* 16 (No. 407).]

1672. ZINNAI, I., and HUKUHARA, N. **[Rooting cuttings from clones of the colchicine-induced tetraploid Sugi (*Cryptomeria japonica*).]** *J. Jap. For. Soc.* 36 (8), 1954 (232–3). 4 refs. [Jap.e.]

Rooting % was the same as for diploids but the tetraploid cuttings rooted earlier, their roots were thicker, and their lateral roots fewer in number.

1673. WELLS, J. S. **New thoughts on Juniper propagation.** *Amer. Nurserym.* 100 (9), 1954 (15, 83 . . . 90).

Notes on propagation of ornamental Junipers (*Juniperus chinensis* varieties) by cuttings, including use of growth-regulating substances.

1674. WOOD, R. S., and DIXON-NUTTAL, M. **A preliminary study of rooting of cuttings of Western Hemlock [*Tsuga heterophylla*].** *Res. Note U.B.C. For. Club* No. 12, 1954. pp. 1.

Decay can be prevented by dipping cuttings in Arasan just before placing them in the rooting medium. One-year-old wood will callus more easily than older wood. Wood from fast-growing trees calluses more easily than wood of the same age from slower-growing trees. Humidity must be maintained at a high level to prevent defoliation of the cuttings.

1675. YOSHISUJI, S., and MATSUO, Y. **[*Eucalyptus* cuttings.]** *J. Jap. For. Soc.* 36 (8), 1954 (225–7). [Jap. ap.e.]

E. robusta was successfully propagated by cuttings from young trees. Survival was better from 30-cm. than from 15-cm. cuttings, but the best method is probably deep planting with 20-cm. material. Treatment with Na α-naphthalene acetate gave positive results. Diameter and height growth were similar to those of seedlings. [Tables and photographs have English legends.] *From authors' summary.*

1676. TAKAGI, T. **[Morphological polarity of stem cuttings of Poplar.]** *Science Bulletin, Faculty of Agriculture, Kyushu University* 3 (1/4), 1951 (248–53). 11 refs. [Jap.jap.e.] L.S.

Cuttings of *Populus alba* were treated with different concentrations of potassium α-naphthalene acetate in lanolin. When treated with 5 and 1 mg./g. concentrations, normal cuttings treated at the apex produced roots at the apex and buds at the base, and inverted cuttings treated at the base produced buds at the apex and roots at the base. This did not occur with concentrations of 0·9 mg. or 20 mg./g., and the latter proved toxic.

1677. WATERMAN, A. M. **Surface sterilization of hybrid Poplar cuttings.** *For. Res. Note Ntheast. For. Exp. Sta.* No. 32, 1954. pp. 3. 2 refs.

Dormant cuttings of selected hybrid Poplar clones were sprayed with a water suspension of mixed spores of *Septoria musiva*, *Dothichiza populea* and *Septotinia populiperda*, dipped in fungicides (13 commercial preparations and $HgCl_2$ were tested), and stored for 1–3 weeks. Only $HgCl_2$ (5% solution in 70% ethanol, with or without rinsing the cuttings before culturing), Ceresan M (2% suspension in water) and Semesan (1% suspension in water) were effective in decreasing or preventing spore germination. Treated cuttings and untreated controls were grown in the greenhouse. Cuttings treated with $HgCl_2$ grew more slowly than controls or those treated with Ceresan or Semesan.

1678. FORD, H. F. **Effect of sterilizing treatments on survival and growth of hybrid Poplar cuttings.** *For. Res. Note Ntheast. For. Exp. Sta.* No. 33, 1954. pp. 3. 2 refs.

Tests were made on the effect on survival and growth at the end of the first growing season of cuttings from different clones, of treatment with $HgCl_2$, Ceresan M or Semesan, already proved successful in sterilizing cuttings against fungus attack. Differences in survival between clones after sterilizing treatment are tabulated; average survivals range from 52 to 90%. Tests on the relative effect of the different treatments show average survivals of 38% with $HgCl_2$, 46% with $HgCl_2$ and rinsing, 76% with Ceresan M, 94% with Semesan and 99% with untreated controls; the respective figures for height growth, based on surviving cuttings, are 21·3, 41·8, 26·3, 49·2 and 35·7 in. Semesan is therefore recommended for sterilizing cuttings; these should be completely immersed in a 1% water suspension for 20 min., and no rinsing is necessary.

1679. Adrianov, S. Predposadočnoe okorenenie čerenkov drevesnyh porod. **[The rooting of cuttings of woody species before planting.]** *Lesn. Hoz.* 5 (1), 1952 (33–5). [Russ.]

A method used in viticulture for stimulating the formation of callus and rudimentary roots and retarding leaf development proved very successful when applied to the raising of Poplars on the 'Gigant' sovkhoz in the Rostov region in 1940. During further trials (1948–49) the following treatment was devised: bundles of cuttings of 'Canadian' Poplar, *Caragana arborescens*, *Salix* sp. and *Ribes aureum* were stood upside down in a trench 75 cm. deep and 8 cm. wide, packed with ice up to 40 cm.; the trench was then filled in with moist earth and covered with a pile of stable manure. The chilled tops of the cuttings are thus retarded while the heat of the manure promotes callus and root formation. *R. aureum* showed the best and *C. arborescens* the poorest callusing after a month of this treatment. Planting was done from late March to late April. Survivals % [after 1 year?] of treated cuttings and controls respectively were Poplar 90–99 and 57–78; *Salix* sp. 92–98 and 30–69; *C. arborescens* 88–92 and 20–52; *R. aureum* 97–100 and 50–70.

1680. Polnar, M., and Horák, K. Vegetativní rozmnožování brslenu evropského zelenými řízky. **[Propagation of *Euonymus europaeus* by green cuttings.]** *Práce výzkum. Úst. lesn. ČSR* No. 4, 1954 (177–92). 2 refs. [Cz.russ.e.]

Presents the results of experiments, from mid-May till mid-Sept. 1952, at the Uherské Hradište experimental station (Moravia) on propagating *E. europaeus* by green cuttings. These, 6–10 cm. long, were placed 2 cm. deep in a sand or sand/peat mixture (under glass cover until establishment of the root system). Of cuttings planted in mid-May to mid-June 50–92% rooted; those planted later (until 31 Aug.) showed an average survival of 30%; only cuttings prepared from seedlings rooted when planted in Sept. Cuttings from young stems root more readily than those from older ones (e.g. 70% for 1-year-old seedlings, and none for 10-year-old shrubs). It was found that indolyl- and naphthylacetic acids have a considerable effect on root formation in cuttings prepared from mid-May till mid-Aug., whereas indolylbutyric acid acts vigorously on cuttings prepared in Aug.–Sept.

1681. Ludera, J. Letní řízkování brslenu evropského (*Evonymus europaea* L.). **[Propagation of *E. europaeus* by summer cuttings.]** *Práce výzkum. Úst. lesn. ČSR* No. 4, 1954 (163–75). 4 refs. [Cz.cz.russ.g.]

Preliminary tests in June–July, 1952, with green cuttings of *E. europaeus*, planted in frames, showed that 88% rooted when cut in the optimum season—timed according to the development stage of the shrub (or shoot); the planting period lasts from ca. 10 June until 15 July. The root began to form 30 days after planting; after 45 days it was moderately developed, and 30 days later rooting was completed.

1682. Kadambi, K., and Dabral, S. N. **Air layering in forestry practice.** *Indian For.* 80 (11), 1954 (721–4 + 1 plate).

Describes experimental work done at Dehra Dun since 1952. Of 42 species tested, 17 were successfully propagated by this method, 8 were propagated with difficulty, and the rest failed. The details of the method are described.

232.329. Miscellaneous (including Greenhouses, Frames, Raising in Pots, Tubes etc.)

See also Nos. 1652, 1654–5, 1667.

1683. Morris, L. G., and Neale, F. E. **The infra-red carbon dioxide gas analyser and its use in glasshouse research.** *Tech. Memor. nat. Inst. agric. Engng., Silsoe* No. 99, 1954. pp. 13. 7 refs.

232.33. *Formation of Stands by Direct Sowing*

See also Nos. 1578, 1698, 1706, 1762, 1942.

1684. Baškirov, N. A. Posev sosny v ploščadki pod zaščitoï snjatoï derniny. **[Direct sowing of Scots Pine on patches protected by the lifted turf.]** *Lesn. Hoz.* 5 (4), 1952 (31). [Russ.]

The usual methods of sowing Pine failed in the *Pinetum myrtillosum* of the middle Ob region, the climate of which is markedly continental ([mean?] temperatures—July +20·4°, January −20° C.; mean annual precipitation 500 mm.), on account of summer sun-scorch of the root collars and drying up of the soil. A sowing method tried in 1951 at Talmen'ka, Altai, was found quite promising. The turf is lifted in May from 0·5 × 0·5 m. patches, cut in half, turned upside down and laid on the southern and northern edges of the patch; the patch is then cultivated and 15 seeds sown in a drill along the middle, running from east to west. The drill is mulched with dry leaves to reduce evaporation; the halves of the turf are then drawn over the patch so that only a narrow slit (5, 10, 15 or 20 cm.) remains just over the drill. Inspection in August of the same year showed the highest survival (73·5%) in patches with a 5-cm. slit and the lowest (6·6%) with a 20-cm. slit; only a few isolated seedlings came up on the control patches.

1685. Sirén, G. Lentokonekylvön tähänastiset tulokset Lapissa. **[Results of sowing from the air in Lapland.]** *Metsät. Aikak.* 1954 (10), (417–8). [Fi.e.]

Nearly 1000 ha. in two regeneration areas in Lapland were sown from a small Piper Cub plane in June. Regeneration in August–September was poor, mainly because of the low germinability of the

seed used. The profitability of the operation is discussed. [Cf. *For. Abstr.* 16 (No. 422).] *From author's summary.*

232.4. Formation of Stands by Planting

See also No. 2078.

1686. **[Silviculture of *Pinus massoniana*.]** *Rep. Dir. Agric. Fish. For. Hong Kong, 1953/54*, 1954 (66–7).

If grass is burnt in autumn, and 1 + 1 nursery transplants ca. 12 in. high planted in February or March, the plantation should be established beyond danger of competition by the end of the summer. Applications of P in the nursery and in planting holes have proved beneficial.

232.41. *Planting Stock (Type, Handling and Treatment)*

See also Nos. 1603, 1665.

1687. **Stump-planting of Sal.** *Rep. For. Adm. W. Bengal 1950/51*, 1954 (17).

Experiments were made in supplementing natural regeneration of *Shorea robusta* by planting out stumped 2-year plants. Planting in May gave better results than in April. The experiment was generally successful.

1688. MULLIN, R. E. **Nursery stock packaging experiment.** *Res. Rep. Ont. Dep. Lds. For.* No. 27, 1954. pp. 16.

An experiment was made with *Pinus resinosa* seedlings, in order to determine the efficacy of baling in burlap sheets compared with packing in crates. The slightly better results of crating were not statistically significant and may be due to the greater quantity of moss used.

1689. MAHLSTEDE, J. P. **Handling evergreens for shipment.** *Amer. Nurserym.* 100 (8), 1954 (12–3, 88 . . . 92).

Describes methods of packing 18- to 24-in. plants of conifers (*Juniperus chinensis* and *Thuja orientalis*) in polyethylene bags with an outer cover of kraft paper, which is a great improvement on the usual commercial methods of packing.

232.42. *Methods of Planting (including Use of Fertilizers etc.)*

See also Nos. 1603, 1707, 2555.

1690. MULLIN, R. E., SCHWEITZER, T. T., and MORRISON, L. M. **Report on planting depths and methods experiments.** *Res. Rep. Ont. Dep. Lds. For.* No. 26, 1954. pp. 27.

A report on 4 experiments carried out over 4 years on planting methods for (1) *Pinus resinosa*, (2) *P. strobus*, and (3) *Picea glauca*, using 5 planting depths (root collar at soil level and 1 and 2 in. below and above soil level) and 4 planting methods—(*a*) wedge method (removal of a wedge-shaped spadeful of soil, plant placed against vertical wall, replacement of soil), (*b*) simple notch, (*c*) hole planting with cone-shaped mound as floor of hole, and (*d*) T-notch. The results showed no significant effects of planting depth for (2) and (3); (1) should not be planted with root collar above soil level. Method (*a*) was best for all species; (*c*) and (*d*) should be avoided for all species, though they have not much effect on (2). All the evidence is against the use of (*d*) in all circumstances.

1691. SMITH, M. B., JR. **Longleaf Pine seedling survival affected by depth of planting.** *Tree Plant. Notes* No. 17, 1954 (13–4).

Preliminary results of experiments indicate that *Pinus palustris* seedlings should be planted with the root collar at, or within ½ in. below, ground level.

1692. PĚNČIK, J. Štěrbinový sazeč a jeho použití. **[The notching spade and its use.]** *Lesn. Knihovna* (*malá Řada*) No. 55, 1954. pp. 62 + [1]. [Cz.] Price *Kčs.*6·30.

According to the author, the best multi-purpose notching spade is a cast-steel spade 25 cm. long, 9–10 cm. wide and 3–4 cm. thick near the junction with the tubular handle, which is 65–70 cm. long, 2·6–3 cm. diam., and has a cross-piece 45 cm. long with ends bent downwards. The booklet includes sections on planting technique and season, efficiency and losses due to the use of the notching spade.

1693. POSPIŠIL, B. Lesní sazece pro štěrbinovou sadbu sosny v Polsku. **[Polish notch-planting tools for Pine.]** *Lesn. Práce* 33 (5), 1954 (222–5). [Cz.]

Illustrated description of the 3 variants of the Polish standardized 'Kostur' planting tool, adapted for sandy, loam, and stony soils.

232.43. *Spacing and Arrangement in Plantations*

See also Nos. 1628, 1711, 1726, 2045.

1694. **Silvicultural research: initial spacing.** *For. Res. Notes N.Z. For. Serv.* 1 (11), 1954 (6). (*Annual Report of the Forest Research Institute, Rotorua, 1953/54.*)

Investigation of the effect of initial spacing in plantations was continued, and further trial areas were planted. To systematize the thinning of stands with different initial spacing, the criterion of relative spacing

$$\frac{\text{distance between trees} \times 100}{\text{height of stand}}$$

has been adopted. A detailed investigation showed the importance of thinning intensity combined with the maintenance of the stand between upper and lower limits, e.g. making 50% thinnings and keeping the stand between 20 and 30% relative spacing at a mean of 25%. By adopting a presumed rotation, schedules have been worked out which fit all species and which prescribe the number of stems for different mean spacings and thinning intensities.

1695. RALSTON, R. A. **Some effects of spacing on Jack Pine development in lower Michigan after twenty-five years.** *Repr.* from *Pap. Mich. Acad. Sci.* 38, 1952 (1953), (137–43). 6 refs.

Plantations on poor sites with an initial spacing of 6 × 6 ft. will yield sufficient merchantable products for a commercial thinning when a thinning is needed from a silvicultural point of view. Height growth is unaffected but diam. increases with wider spacing. Spacings wider than 8 × 8 ft., however, are undesirable. A total of ca. 600–700 stems/acre at 25 years seems to be the best stocking for maximum return. Spacings of 6 × 6 ft. with 50% survival or 6 × 8 ft. with 70% survival should give enough

stems for a commercial thinning after about 30 years. *From author's summary.*

1696. RALSTON, R. A. **Some effects of stand density on the height growth of Red Pine on poor sites in northern lower Michigan.** *Repr.* from *Pap. Mich. Acad. Sci.* 39, 1953 (1954), (159–65). 13 refs.

Cites an example of a stand in which *Pinus resinosa* height growth was retarded by close spacing. After 35 years the dominant trees in a plantation spaced at 4 × 4, 6 × 6, 6 × 8, and 8 × 9 ft. averaged 25·4, 27·8, 29·8 and 31·5 ft. respectively in total height. *From author's summary.*

232.5. Artificial Formation of Stands by Vegetative Propagation

1697. BJALLOVIČ, JU. P. Posadka želtoĭ akacii neukorenennymi čerenkami v zasušlivyh uslovijah. **[Propagation of *Caragana arborescens* by unrooted cuttings under arid conditions.]** *Lesn. Hoz.* 5 (2), 1952 (43). [Russ.]

Shortage of *C. arborescens* seed due to *Etiella zinckenella* attack led to a successful trial of unrooted cuttings instead of seed. Late in the autumn of 1948, in the Zaporozh'ye region of the Ukrainian SSR, cuttings 40–60 cm. long (preferably 2–3 years old) were taken, and stored for the winter, covered with moist earth, in a cellar; in spring they were cut into pieces 15–20 cm. long and planted direct (to beat up a plantation) in holes dug on a heavy clay-loam southern chernozem poor in humus. They were not watered, either at planting time or later, though the summers of 1949 and 1950 were very dry. In spite of the severe winter of 1949–50, a survey in July 1950 showed > 80 % survival and each cutting had 1–4 strong shoots 60–80 cm. long; bacterial nodules were abundant on the roots.

233. *Afforestation*

See also Nos. 1353, 1358, 1377, 1504–6, 1587, 1602, 1610–15, 1620–2, 2555–7.

1698. ZEHETMAYR, J. W. L. **Experiments in tree planting on peat.** *Bull. For. Comm., Lond.* No. 22, 1954. pp. iv + 110 + 25 photos. 33 refs. Price 10*s*.

Summarizes the results of numerous experiments carried out in various parts of Great Britain over a number of years, which have dealt mainly with methods of establishing crops of trees on peat [cf. *For. Abstr.* 14 (No. 1186); 15 (No. 1315)]. It contains the following chapters: (1) The characteristics of the peatlands; (2) The development of peat planting in Great Britain up to 1919; (3) Developments in peat planting since 1919; (4) Description of the experimental areas; (5) Site preparation and planting; (6) The species most commonly used in the peat experiments [Mountain, Scots and Contorta Pines, Japanese and hybrid Larches, Norway and Sitka Spruce]; (7) Trials of species less widely used on peat [*Abies balsamea, A. grandis, A. nordmanniana, A. procera, Chamaecyparis lawsoniana, C. nootkatensis, C. obtusa, Cryptomeria japonica, Cupressus macrocarpa, Larix decidua, L. gmelini, Picea engelmannii, P. glauca, P. mariana, P. omorika, P. rubens, Pinus jeffreyi, P. koraiensis, P. nigra* var. *austriaca* and var. *calabrica, P. peuce, P. pinaster, P. ponderosa, P. strobus, P. thunbergii, Pseudotsuga macrocarpa, P. taxifolia, Sequoia gigantea, S. sempervirens, Taxodium distichum, Thuja occidentalis, T. orientalis, T. plicata, Tsuga canadensis, T. heterophylla, Alnus incana, A. oregona, A. sitchensis, A. viridis, Betula japonica, B. pubescens, B. verrucosa Sorbus aria, S. aucuparia, S. intermedia, Quercus robur, Salix* spp.]; (8) Manuring; (9) Trial plantations and high elevation experiments; (10) Other experiments [direct sowing, shelterbelts, protection against blackgame, salvage of checked Spruce plantations]. A report by Dr. *H. M. Steven* (1923) on tree root form on peat is printed as an appendix.

1699. WOOD, R. F., and THIRGOOD, J. V. **Survey of tree growth on colliery spoil heaps.** *Rep. For. Res. For. Comm., Lond. 1952/53*, 1954 (43–7).

A summary report on a survey of colliery spoil mounds in all English, Welsh and Scottish coalfields. In all, more than 200 sites were examined, some 90 of which were completely tree-covered. The general impression is that many of these sites, particularly in rural districts, are capable of producing respectable crops, and most are capable of carrying tree growth, provided always that the plantations can be protected from human depredation. The principle points noted are: (1) Spoil heaps are usually reasonably fertile, and can also provide sufficient moisture to support tree growth. (2) Difficulties due to instability and erosion are not usually excessive, though eroding heaps of very fine material such as washery waste may be impossible to plant without special measures to check gully formation. (3) Actual toxicity is probably rare and, when it occurs, is often quite local. (4) The very high modern conical bings may present special difficulties, largely due to exposure on the higher slopes. (5) The choice of planting species is governed first by local conditions, particularly the factor of smoke pollution, which rules out most conifers. There may be some further restriction to less demanding species on burned heaps and older, more acid heaps. (6) Special measures such as levelling and the importation of soil are not usually warranted, nor is the use of extra large stock. (7) When there has been a failure to establish satisfactory plantations, accident and vandalism have been the main causes. A number of conifers have done very well in rural coalfields, notably Scots, Corsican, and Austrian Pines, and European and Japanese Larches. In the smoke-polluted atmosphere of the Black Country, Common Alder, Wych Elm, Sycamore Maple, Ash, Robinia, Rowan and Hawthorn have all been recorded as attaining satisfactory stature. Alders seem to have been particularly valuable in Black Country plantations on the sticky grey clay from weathered shale. Grey Alder (*Alnus incana*) has succeeded very well on one spoil heap in the Forest of Dean.

1700. FREESE, F. **Tree species for planting spoil banks in North Alabama.** *Tree Plant. Notes* No. 17, 1954 (15–8).

Pinus taeda is much the most satisfactory of the species tried on these spoil mounds from strip-mining, except on moist margins, where Sycamore [*Platanus occidentalis*?] is recommended.

1701. TURY, E. A meszes és meszesszódás szíkes talajok fásítási kérdései. [**Problems of afforestation on calcareous and calcareous-soda alkaline ('szik') soils.**] *Erdészeti Tudományos Intézet Évkönyve, Budapest* 2, 1952 (1954), (90–105). [Hu.] From *abstr.* in *Hung. agric. Rev.* 3 (3), 1954 (7–8). [E.] C.G.B.

The pH of the top layer of calcareous *szik* soils, was found to range from 7·4 to 8·5, and no alkali could be determined by phenolphthalein reaction to a depth of 30 cm. In calcareous-soda soils, the top layers have pH 8·5 with perceptible alkali. Observations of 13- to 15-year stands of *Quercus robur* growing on such sites showed that: alkalinity of pH 7–9 does not hinder the development of the root system, or impair vigorous growth of the aerial parts; underground alkalinity > pH 9 retards, but does not stop, growth if the Na_2CO_3 content is < 0·2%, the top 30–40 cm. layer is only slightly alkaline, and the water table is only 1–2 m. deep; a lime content of > 15% dries out the soil physiologically and only mixed stands with shrub understorey can be established on such sites; despite a higher Na_2CO_3 content, horizontal root development is better in heavy clay soils (with their better moisture and humus content) than in sandy soils.

1702. TURY, E. Különböző típusú szikes talajok kocsányostölgy állományai. [**Stands of *Quercus robur* on different types of *szik* soil.**] *Erdö* 2 (4), 1953 (342–51, 391, 395). [Hu.russ.f.]

Experiments to date indicate that *Q. robur* may be used with profit for the afforestation of *szik* soils that have undergone acidification and complete leaching, especially of $CaCO_3$, regardless of very bad alkali conditions in the subsoil, provided that the topsoil is suitable. On the less leached, decalcified, and neutral or slightly alkaline *szik* soils, good results may be obtained with Oak, provided that the deterioration of the subsoil with depth is only gradual. For afforestation with Oak, chernozems with alkaline subsoil (hidden alkali conditions) may be rated like degraded *szik* soils of acid reaction. The author emphasizes that when making site assessments on *szik* soils, diameter as well as height of the trees must be taken into account. Biological maturity of Oak on *szik* soils is reached at 15–20, and age of exploitability at 35–60 years. The importance is emphasized of afforesting Hungarian *szik* soils with Oak, because of the abundant acorn crops which will be produced from the tenth year onwards, the comparatively rapid maturing of the stands and their favourable influence, as windbreaks, on agricultural crops.

1703. HÉDER, I. A kopárfásítás helyes megszervezése s a mikroreliefek fontossága a kopárfásításban. [**Proper organization and importance of microrelief in the afforestation of barren areas.**] *Erdö* 1 (3/4), 1952 (221–36, 311, 317–8). [Hu.russ.g.]

The two types of barren areas distinguished in mountain regions subject to erosion and requiring afforestation in Hungary are those where either (1) the upper third of the slope is seriously eroded (rocky mountains developed on hard parent material) or (2) the erosion occurs midway or at the base of the slope (foothills covered with soil overlying soft parent material). The barren areas may be further subdivided into different sub-types according to exposure (south, north), position of the site (e.g. ridges or tops of mountains, flat or steep hills), and nature of the parent rock (dolomite, limestone and andesite in mountain regions; sandstone and loess in the foothills). Owing to differences in the trend and degree of erosion, afforestation should proceed from the base up the slope of rocky mountains, and from the plateau downwards on barren hillsides covered with soil, a practice said to result in a progressive improvement of soil conditions, microclimate and moisture economy.

Tree species and shrubs suitable for the afforestation of each type of barren area, and the time and method of planting, are discussed in detail with particular reference to the dominant parent rock in the area. Thus for type (1), on dolomite, broad-leaved species e.g. *Quercus pubescens*, *Q. cerris*, *Acer campestre*, *Prunus mahaleb* are recommended on the lower slopes where densely covered with shrubs (these to be cleared chequer-wise), and *Pinus nigra* where there is no shrub cover; and *P. nigra* on the upper slopes, hill tops, and thin soils, along with belts of shrubs or (temporary) wattle fencing. *Celtis australis* may also be used on plateau slopes.

The general principles are also outlined and illustrated of constructions (terrace, soil pockets etc.) designed to develop the most suitable microreliefs for run-off control and proper moisture storage.

1704. PENEV, N. Sravnitelni opiti săs zalesjavane v terasi-kanavki i v dupki. [**Comparative afforestation trials with planting seedlings in contour trenches and pits.**] *Nauč. Trud. lesoteh. Fak. selskostopan. Akad., Sofia* 2, 1953 (155–78). 18 refs. [Bulg.bulg. russ.]

Two-year-old *Pinus sylvestris* and *P. nigra* var. *austriaca* were planted in 1939–42 near Sofia on eroded cinnamon-brown forest soils (S. aspect, 15–30° slope) in: (1) 40 × 40 cm. pits, 7000/ha., as controls; (2) contour trenches of triangular (40–45 cm. deep, 90–95 cm. wide, and 1·2 m. long) and trapezoid cross-section (bottom width 20 cm., top 110–120 cm., length 12 m.), both types having the following slopes: external slope (covered with stones) 55°, inward face of trench 35° (planted up), outward face 50°. As compared with pits, the trenches were found to retain much more moisture from snow and rainfall, the soil down to 20–40 cm. containing during the growth period 4–9 times as much; the temperature on the planting face during hot summer days was 4–5° C. lower, and after 13 years, losses due to dying-back were $\frac{1}{4}$–$\frac{1}{8}$ and the trees were twice as high, with larger buds and needles.

1705. GRÜNIG, P. Anbauergebnisse mit verschiedenen Weidenarten im Aufforstungsgebiet des Höllbachs (Kt. Freiburg). [**Experiments with various species of Willow in afforestation of the Höllbach (Canton of Freiburg).**] *Schweiz. Z. Forstw.* 105 (11), 1954 (617–21). 4 refs. [G.f.]

The Willows that are natural pioneers on virgin soils (*Salix purpurea*, *S. daphnoides*, *S. elaeagnos*, *S. appendiculata*, and *S. caprea*) took very well on a

steep unstable slope with no vegetation, but their development was hindered by movement of snow on the slope. The marsh species (*S. aurita*, *S. nigricans*), planted on a peat bog, established themselves only on the drier parts.

1706. Vrdoljak, Ž. Nekoliko napomena za uzgoj rašeljke. [**Some remarks on the growing of *Prunus mahaleb*.**] *Šum. List* 78 (7), 1954 (333–6). [Croat.]

Presents the results of sowing experiments in nurseries and in the field. Survival of 70% or better was obtained in nurseries when (1) seeds were sown directly after collection (early in August), (2) non-stratified seeds were sown in late October, and (3) non-stratified seeds were sown in March. For the field tests, A. Giacobbe's 'ecological indicator' method (*Riv. for. ital.* No. 3, 1939) was used; according to this, all kinds of possibly suitable seeds are broadcast on non-cultivated soil in a degraded area; the species that finds favourable germination conditions is considered to be that suitable for afforestation. The following seeds were broadcast in 1951 on a karst-type soil near Klis: *Pinus nigra*, *P. halepensis*, *Cupressus sempervirens*, *Fraxinus ornus*, *Carpinus orientalis*, *C. betulus*, *Acer campestre*, *A. monspessulanum*, and *Prunus mahaleb*. Only the last-mentioned species showed a relatively high survival rate (ca. 13%).

1707. Pogrebnjak, P. S., Florovskiĭ, A. M., and Ilʹkun, G. M. Torfjano-gnezdovye kuljtury. [**'Peat-nest' method of planting Pine.**] *Lesn. Hoz.* 5 (2), 1952 (11–7). [Russ.]

Extremely poor moisture-retaining capacity and a very low N content account for the complete failure of all previous attempts to fix the shifting sands of the lower Dnieper with Pine planted by the usual method. Recently, good results have been obtained with a method devised about 1950 by the Silvicultural Institute of the Academy of Sciences of the Ukrainian SSR, consisting in introducing a buried layer of peat to conserve moisture and supply N. Holes 50 × 50 cm. and 30–40 cm. deep are dug in autumn and the bottom of each is covered with 9–10 kg. of peat (4–5 metric tons/ha.) mixed with a little sand; in spring they are filled with moist sand and each is planted with 9 Pine seedlings, using Kolesov's notching spade. This method, combined with dusting [of the plant roots?] with BHC [rate not stated], gave 96% survival in the first year (1950) and no further mortality in the next. All controls failed owing to drought, cockchafer damage, or both. The trial was made on a stretch of barren sand (Starobelsk Forest, Ukraine) where 7 consecutive attempts to raise Pine in the last 30 years had failed. A second trial (Kherson district) in the hot, dry summer of 1952, with sandstorms, showed 85% survival for Pine planted in 'peat nests', and only 18% for that planted by various other methods without peat. Observations showed that the Pine developed a dense system of thin, short assimilating rootlets within the peat and also some thicker roots growing downwards and outwards. It is essential for the soil to be kept free of weeds whose roots will exploit the peat before those of the Pine. Another method of introducing peat, by putting it direct into the notch (300–400 g. per plant), has been found less successful.

1708. Ratjkovskiĭ, S. P. Assortiment porod pri lesomeliorativnyh i lesokulturjnyh rabotah v gorah Uzbekskoĭ SSR. [**Choice of species for protective afforestation in the mountains of the Uzbek SSR.**] *Lesn. Hoz.* 5 (1), 1952 (19–22). [Russ.]

The article is based on a study of the growth of various species in the protection forests of the Ferghana, Tashkent and Samarkand regions, where protective afforestation began in 1879 (near Aman-Kutan in Samarkand) and 1000–2000 ha. were planted in the first 38 years. The choice between the planting of timber and of fruit trees depends to a great extent on the need for irrigation and on extraction conditions. Sites needing irrigation for satisfactory growth and timber quality in forest trees, and those where extraction is difficult, should be reserved for fruit-trees, which yield the largest crops on non-irrigated soils. Study of coniferous plantations in the mountains of the Central Asian Soviet Republics has shown that the failure of Spruce, Silver Fir and Pine was due to the high pH of the soil and of the parent rock; but where high precipitation (as in parts of the Kirgiz SSR) has reduced the pH, conditions are suitable for *Picea schrenkiana* and *Abies sibirica*, with their shallow root systems, but not for Pine, which failed as soon as its tap roots reached the basic parent rock. On soils derived from parent rocks with a low pH the Pine showed normal development and Spruce and Silver Fir formed well stocked stands. Siberian Larch grew well on both acid and basic soils. Tree and shrub species recommended for planting at altitudes of 1000–2000 m. are tabulated according to site types.

1709. Allard, and Perrot. Reboisements industriels au Maroc. [**Commercial afforestation in Morocco.**] *Terre maroc.* 28 (296), 1954 (253–7). [F.] E.M.B.

A detailed account of raising Eucalypt plantations, chiefly *E. rostrata* and *E. gomphocephala*, with mechanical cultivation.

1710. Essais en savane. [**Experiments in the [Lower Congo] savanna.**] *Rapp. Inst. nat. Étude agron. Congo belge 1953*, 1954 (228–9). [F.]

Gives the % survival on heavy and light soils of the 18 satisfactory species of 43 tried in direct sowings [for thickening up savanna].

1711. [**Afforestation of the upper catchment of the Kahawa.**] *Rapp. Inst. nat. Étude agron. Congo belge 1953*, 1954 (431). [F.]

The experimental reforestation of the upper catchment of the Kahawa has been undertaken using Anderson's spaced-group planting method [cf. *For. Abstr.* 13 (No. 2091)] with six species of Eucalypt, and other exotic and indigenous species. The method is also one of the treatments in a replicated trial in raising *Podocarpus usambarensis* in three ecologically designated sites with three spacing treatments.

1712. LEGGAT, G. J. **A Uganda softwood scheme.** *Emp. For. Rev.* 33 (4), 1954 (345–51 + 6 photos). 4 refs.

Describes the Lendu planting scheme (mainly *Cupressus lusitanica* and *C. benthami*), methods employed, labour difficulties, fire protection, pruning etc.

1713. DREES, E. M. **Silvicultural problems in dry monsoon areas in Indonesia.** *Tectona* 43 (1/2), 1954 (111–8). [E.e.]

'Dry monsoon areas' are defined as those lowland regions (up to 500 m.) that are unsuitable for Teak plantations, owing to deficiency or unfavourable distribution of rainfall. Possibilities of afforestation are discussed.

1714. ALPHEN DE VEER, E. J. VAN. **Plantations of *Pinus merkusii* as a means of reafforestation in Indonesia.** *Tectona* 43 (1/2), 1954 (119–30). 6 refs. [E.e.]

Discusses the history of *P. merkusii* plantations in Indonesia, and describes planting methods. The suitability of this species for afforesting lalang (*Imperata cylindrica*) plains is discussed Heavy thinnings at an early stage, admixture of broad-leaved species, and planting of firebreaks would be necessary.

1715. DELIZO, T. **Paper Mulberry (*Broussonetia papyrifera* Vent.): some notes on its behaviour as a possible reforestation crop in the Philippines.** *Philipp. J. For.* 9 (1/4), 1953 (1954), (107–17 + 1 dgm. + 4 plates). 8 refs.

B. papyrifera is propagated by root cuttings. Cuttings of 1·5 cm. diameter class showed the greatest number producing shoots and highest survival. Diameter growth is very variable, diameters ranging from 2 to 22 cm., average 12 cm., 4 years after planting. Height at the same age varies from 3·6 to 17·5 m., average 12·3 m. The trees spread rapidly by suckering and eradicate *Imperata cylindrica* within 4 years from planting.

1716. CLAVERIA, J. R. **Hambabalud (*Neonauclea formicaria* (Elm.) Merr.) as a reforestation crop.** *Philipp. J. For.* 9 (1/4), 1953 (1954), (145–70 + 6 plates). 7 refs.

A study was made of this species, which produces a good, durable timber for general purposes, with a view to its use in afforestation, particularly of the large *cogon* (*Imperata cylindrica*) areas in the Philippines. The particular subjects of study were (1) the root and stem development of seedlings, (2) the relationship between the growth of stems and roots of wilding and nursery seedlings, (3) the behaviour of the species in the forest and plantation, and (4) the effects of grazing on natural regeneration. Methods of sowing, planting etc., are described incidentally. Counts of regeneration in similar grazed and ungrazed areas showed ca. 10,530 trees/ha. (5–35 cm. d.b.h.) in ungrazed, compared with only 3 trees (20–25 cm. d.b.h.) in grazed areas. The destruction of reproduction in the latter is probably due as much to deliberate *cogon* fires as to actual browsing. Mean annual diameter growth is 0·43–0·72 cm. from 5 to 14 years, and mean annual height increment for the same ages 0·5 to 0·7 m.

235. *Underplanting, Advance Planting etc. Nurses and Formation of Mixtures. Interplanting of Inferior Growth*

See also Nos. 1353, 1576, 1602, 1610, 1613, 1628, 1873, 2049–50, 2511.

1717. SKILLING, D. D. **The growth of underplanted White Pine.** *Mich. For.* No. 2, 1953. pp. 2.

The high survival and good condition of 21-year-old *Pinus strobus*, planted under an open hardwood stand on a dry sandy site is described (56% survival, mean height 7·1 ft.). Artificial release is not necessary, since release will occur naturally from the deterioration of Aspen in the overstorey.

1718. GEERINCK, P. A., GETCHELL, W. A., and CHAPMAN, G. L. **Response to release of underplanted White and Red Pine.** *Tech. Note Univ. Me. For. Dep.* No. 29, 1954. pp. 2.

Experiments were made in 1943 on the effect of varying degrees of release on Red and White Pine underplanted in alternate rows in a mixed hardwood stand in 1936. Measurements in 1953 showed that Pine growth was most satisfactory in the plots completely released or with all but a few smaller hardwoods removed. In the latter plot shading by the residual hardwoods reduced the amount of hardwood sprouting.

1719. **Research studies: the mountains; excessively wet problem area.** *Carib. For.* 15 (1/2), 1954 (12–3). (*Rep. U.S. trop. For. Exp. Sta.* 14, [1953?].)

Presents some figures showing increment in Colorado-type forest in this area of Puerto Rico after improvement fellings. Only *Matayba domingensis* is outgrowing other species to a significant degree. *Bambusa tuldoides* underplanted in the Luquillo Forest was very chlorotic 6 years after planting, but recovered after fertilizer applications. Other promising species for underplanting are *Eucalyptus alba* and *Casuarina cunninghamiana.*

1720. KORTZ, A., and SOEDARMA, M. H. Kebakaran[2] hutan di ardjuno dan semeru dan pembuatan tanaman *Acacia decurrens.* [***A. decurrens* plantations on burnt areas in the Ardjuno and Semeru.**] *Rimba Indonesia* 3 (8/10), 1954 (358–70). 13 refs. [Jav.jav.e.]

When grasslands are burnt in the extensive fires occurring every year in the mountains of E. Java, *A. decurrens* can be planted as a preliminary to the formation of mountain forest. Species to be planted with *A. decurrens* include *Podocarpus imbricatus*, *Castanopsis argentea*, *Quercus* spp., *Schima noronhae* and *Michelia* sp. On high sites, *Cestrum* should be used instead of *Leucaena glauca* for interplanting. *From authors' summary.*

1721. KLOPOV, A. A., and MALJCEV, M. P. Puzyrnik drevovidnyĭ v zaščitnyh lesonasaždenijah. [***Colutea arborescens* as a soil-protecting shrub.**] *Lesn. Hoz.* 5 (1), 1952 (35–6). [Russ.]

Trials with *Colutea arborescens* in the Stavropol region showed its superiority, in extreme drought resistance, to the extensively planted *Caragana arborescens.* Hot dry winds defoliate the latter a fortnight earlier than the former, in which warm rainy weather will cause a fresh flush of new leaves. Two

forms of *Colutea arborescens* should be distinguished: (1) unripe fruit pink or slightly reddish; ripe fruit pale or reddish brown, leaves bright green; and (2) unripe fruits pale green, ripe fruits and leaves whitish green. (1) is the more frost-hardy; at 3 years old it has a deeper root system, with a rudimentary tap root penetrating into the subsoil (1·7–1·9 m.); for these reasons it appears to be preferable to (2).

1722. GRIGORJEV, G. V. Selitrjanka—kustarnik dlja zaščitnogo lesorazvedenija v polupustyne. [***Nitraria*—a shrub for protective plantations in the semidesert.**] *Lesn. Hoz.* 5 (4), 1952 (32). [Russ.]

Briefly describes *N. sibirica* and *N. schoberi*, which are widespread in the Karaganda-Dzhezkazgan region, Kazakhstan. They bear edible fruit and should be tried for protective plantations on saline soils of the semi-desert zone. Best growth has been observed on moist solonchak soils in the Dzhezkazgan district.

1723. AZQUETA Y GOITIA, J. M. Masas mezcladas de *Pinus insignis*, Doug. [**Mixed stands of *P. radiata*.**] *Montes, Madrid* 10 (58), 1954 (256–62). [Span.]

Although *P. radiata* is usually classed as a light-demanding species, under Spanish conditions it will tolerate some shade, and can be mixed with *Quercus robur* and *Q. rubra* to their mutual advantage, the Oak improving the humus and the Pine favouring natural pruning and straight growth of the Oak. Degraded Spanish *Q. robur* stands can be cleared of all but good Oak regeneration and interplanted with Pine. Notes are presented on mixed stands of Pine and *Q. rubra* now existing in Guipuzcoa, with discussion of tending and management of both types of mixed stand.

1724. OLENJUK, N. A. Vnedrenie greckogo oreha v lesnye kuljtury. [**The introduction of *Juglans regia* into forest plantations.**] *Lesn. Hoz.* 5 (4), 1952 (30). [Russ.]

Walnut is planted in the Kamenets-Podolsky leskhoz (Ukraine) in admixture with Oak (1 row of Oak, 2 rows of accessory trees and shrubs each 8th or 9th place being planted with Walnut; or 2 rows of Oak and one of Ash, Walnut, Ash, Lime). The condition of the plantations is satisfactory. In the 1936–39 plantations, survival of Walnut is 25–30% (height up to 4 m.; mean diameter [b.h.?] 4–5 cm.); in the 1945–49 plantations 65–70% have survived (height up to 1 m.; mean diameter 1–2 cm.). The 1950–51 plantations show survivals of 98–100% for Walnut. The soil under the Walnut needs to be cultivated during the first 12 years, as the sparse crown encourages weeds which check the growth of the tree.

1725. JUNAŠ, G. G. Opyt vosstanovlenija duba v malocennyh listvennyh molodnjakah. [**Improving the stocking of Oak in young hardwood stands of poor composition [in the USSR].**] *Lesn. Hoz.* 5 (1), 1952 (42–5). [Russ.]

Describes a method of enriching 10- to 20-year-old natural regeneration of Ash, Elm, Lime and Maple having a low proportion of Oak, based on trials made on the Krasny Leskhoz on site qualities I–III. Strips 2 m. wide, running N.–S., are cleared at 5-m. intervals and on these Oak is sown in autumn (2 acorns every 0·5 m. in 2 lines 0·5 m. apart). After 3–4 years the strips are widened by 1 m. to admit more light; and in a further 3–4 years the alternate strips of the original mixed growth are coppiced. If properly carried out, this method is said to raise the proportion of Oak in the stand to 70%.

1726. IRONSIDE, G. E. **Spaced group planting.** *Malay. Forester* 17 (4), 1954 (203–6). 1 ref.

Preliminary account of an attempt to adapt M. L. Anderson's method of group planting [cf. *For. Abstr.* 13 (No. 2091)] to the enrichment of *belukar* (secondary jungle) in Malaya by planting groups of 13 valuable species 3 ft. apart, with one chain between groups.

236. *Care of Regeneration or Plantations in the Initial Stages of Establishment* (*including Regeneration Surveys*)

See also Nos. 1591, 1625, 2046.

1727. SHIPMAN, R. D. **Release of Loblolly Pine by various weeding methods.** *Res. Note Stheast. For. Exp. Sta.* No. 65, 1954. pp. 2.

In a study on a site with abundant Pine seedlings in fierce competition with hardwood and brush 3–12 ft. high, 3 years after felling all except seed trees, conventional cutting back of hardwoods and brush with a machete gave satisfactory release, freeing 70% of the seedlings, while cutting and spraying the stumps with 2,4,5-T, gave 97% release at twice the cost, and basal spraying with 2,4,5-T 80% release.

1728. BATEN, W. D., and AREND, J. L. **A laboratory study of various systematic sampling methods applicable to forest-regeneration surveys.** *Repr.* from *Pap. Mich. Acad. Sci.* 39, 1953 (1954), (113–23).

The following conclusions are drawn: (1) Estimates of the total number or quantity of seedlings should be based on samples totalling more than 4% of the area. Below 4% no particular sampling design or sample plot arrangement can be expected to provide reliable estimates of quantity. (2) Fairly dependable estimates of the % of plots stocked with one or more seedlings appear to be possible when as little as 2% of the area is sampled. (3) Offsetting continuous series of 5 or 10 plots diagonally across the sample population may be a sampling method to consider in forest-reproduction surveys. *From authors' summary.*

1729. KER, J. W. **Distribution series arising in quadrat sampling of reproduction.** *J. For.* 52 (11), 1954 (838–41). 7 refs.

Compared with the cheaper stocked-quadrat method, usually adequate for management purposes, regeneration surveys which record the number of established seedlings in each quadrat have the advantage of providing data for testing whether the numbers of quadrats with 0, 1, 2, 3 . . . seedlings follow some distribution series, the nature of which will depend on the density or stocking and whether seedlings are distributed randomly or in clumps.

Loblolly Pine seedling counts from 120 milliacre-quadrats in selectively cut stands were tested for Poisson and for negative binomial distribution (3 methods) and found to agree with the latter. This indicates clumpiness, which is to be expected in the earlier opening of the canopy. With larger opening, e.g. in clear felling or the uniform system, more homogeneity may exist, but the restocking of an extensive old burn in British Columbia has also shown satisfactory agreement with the negative binomial distribution.

237. *Amelioration of Forest Sites*

See also Nos. 1355, 1358, 1506, 1586, 1698, 1735–6, 1854.

1730. Němec, A. Vliv hnojení na degradované lesní půdy v polesí Lovčice. **[Effect of fertilizers on the degraded soils of the Lovčice forest range (Bohemia).]** *Práce výzkum. Úst. lesn. ČSR* No. 3 1953 (149–82). 5 refs. [Cz.cz.russ.e.]

These soils, under Spruce/Pine, showing strong acidification, lack of Ca, and leaching of K, Mg and P, were treated from 1933 with wood ashes and mineral fertilizers, along with artificial regeneration. The best response to fertilizers appeared in the 3rd year of growth. One of the (not necessarily direct) effects of manuring was the increase of soluble nutrients in the top soil layer. Despite manuring with basic slag and Kainite, the underplanting of young Beech in an old Spruce/Pine stand slightly increased the soil acidity, the liming being inadequate.

1731. Němec, A. Meliorace krnících lesních kultur na podzolu se stmelencem pokrýváním půdy vřesem a hnojením basickou horninou. **[The improvement of stunted forest stands on podzols with hardpan, by covering the soil with heather and manuring with a basic rock.]** *Práce výzkum. Úst. lesn. ČSR* No. 4, 1954 (5–34). 14 refs. [Cz.russ.e.]

In the north-Bohemian degraded sandstone soils derived from Cretaceous formations and characterized by podzols with hardpan, the covering of the soil with cut or mown heather stimulated the growth of Spruce. Though the heather cover did not stop the degradation process (although the proportion of soluble Ca, Mg and K was increased), it conserved soil moisture. Addition of basalt quarry waste, although without spectacular growth effects, increased soil pH and the proportion of the available main nutrients and trace elements. Combined heather/basalt treatment gave excellent results. A similar treatment (heather cover and diabase meal) applied in the same locality (Valdštyn near Doksy) to *Alnus glutinosa* stands had similar effects, much better than those obtained with either heather or diabase meal alone.

1732. Němec, A. Směrnice pro melioraci degradovaných lesních půd: Pokyny pro použití mouček basických vyvřelin k melioraci krnících kultur a porostů na degradovaných a ochuzených lesních půdách. **[Guide to the improvement of degraded forest soils: hints on the use of basic igneous rock dusts for the improvement of stunted plantations and natural stands on degraded and impoverished forest soils.]** *Lesn. Knihovna (malá Řada)* No. 28, 1953. pp. 31. 19 refs. [Cz.] Price *Kčs.*2

Practical advice, based on the author's well known researches, describing the chief soil types concerned (podzolized soils and iron-pan podzols, degraded rendzinas and groundwater soils) with notes on profile investigation, soil sampling and analysis to determine rates of application, technique of application of rock dusts (quarry wastes), composting, spreading of heather or brushwood, choice of species, and the conversion of pure conifer stands.

1733. Heiberg, S. O., Stone, E. L., and White, D. P. **Potash and magnesium fertilization of young Pine and Spruce.** College of Forestry, Syracuse, N.Y. [1954?]. pp. 8.

Directions when and how to apply K and Mg to plantations of Spruce and Pine on poor sandy soils (old fields, burns etc.) in the Adirondacks.

1734. **[Fertilizer treatment in young Eucalypt plantations.]** *Rep. Dir. Agric. Fish. For. Hong Kong, 1953/54,* 1954 (67).

Eucalypt plantations in Hong Kong usually go into check soon after planting, but respond immediately to small applications (½–1 oz./plant) of $(NH_4)_2SO_4$ and may reach a height of 3–4 ft. by the end of the growing season with no further treatment. These bigger trees also survive the winter better and resume growth more vigorously next year.

238. *Timber Plantation Crops requiring Special Treatment*

1735. Jobling, J. **Silvicultural experiments on Poplars.** *Rep. For. Res. For. Comm., Lond. 1952/53,* 1954 (49–53).

Work on Poplars was continued and expanded. The benefits of mulching or mounding round plants at the time of planting were confirmed, and good responses were obtained to applications of N fertilizers. Striking improvements in growth and leaf colour resulted from applying lime on acid soils. Cuttings raised at wide and close spacings in the nursery grew equally well when planted in the forest. Experiments have been started to determine to what extent deaths in the year of planting may be due to drying out of the roots after lifting in the nursery, and further studies on liming and N manuring are being carried out. A special study is being made of the best age and type of plant of the Aspen hybrid *P. tremula* × *tremuloides* to use, as it has proved difficult to establish by normal planting methods.

1736. Metreveli, P. A. Kuljtury topolja kanadskogo v Kolhide. **[Plantations of *Populus deltoides* in Colchis (Georgia).]** *Lesn. Hoz.* 5 (1), 1952 (37–8). [Russ.]

Plantations of this Poplar in the Zugdidi leskhoz, on grazed Alder sites, at first failed owing to the waterlogging and compaction of the soil. For later plantations, drainage was undertaken and the sites clear-felled and stumped. At 15 years old these reached a mean diameter of 23 cm. and a yield of up to 300 cu.m./ha. (83% merchantable). The author suggests an initial spacing of 1 × 2 or 1·5 × 2 m.,

with no thinning until the tenth year, for production of high-grade pulpwood on a 15-year rotation.

24. TENDING OF STANDS AND TREES

See also No. 1598.

241. *Cleanings*

1737. PLETMINCEVA, T. Vlijanie intensivnyh rubok uhoda na kačestvo dubovyh molodnjakov. **[Effect of heavy cleanings on the shape and soundness of Oak in the thicket stage.]** *Lesn. Hoz.* 5 (4), 1952 (52–3). [Russ.]

A study of Oak thickets in part of the Shipov forest, Voronezh, showed that a high proportion of the stems were crooked and affected by heart rot. The crookedness always occurred at certain definite heights from the ground and coincided with parts of the stem showing cankers, frost cracks and sunscorch; the heart rot also started at such injured parts. The levels at which crookedness started were found to coincide with years when the thickets had been heavily cleaned, and the condition is attributed to the effects of sudden exposure. It is estimated that as a result of 3 consecutive heavy cleanings, 60–70% of the Oak became affected by heart rot.

242. *Thinnings*

See also Nos. 1491, 1694–5, 1742, 2045–7, 2050, 2065, 2081, 2122–3.

1738. HILL, A. W. **Birch thinning experiments in Ontario.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (4), 1954 (1–2).

In both Yellow and White Birch plots, removal of 75% of the basal area of the stand resulted in damage to residual trees, which was more extensive after 5 years than that in lightly thinned stands (25% removed). Yellow Birch, on the whole, is able to adapt itself more rapidly than White Birch to changes caused by thinning.

1739. **[Thinning *Eucalyptus pilularis*.]** *Rep. For. Comm. N.S.W. 1951/52*, 1954 (10).

Results of thinning experiments in dense stands of natural regeneration of Blackbutt (*E. pilularis*) indicate that thinning is not essential before a top height of 55–60 ft. is attained, after which a reduction of stocking to ca. 200 stems/acre is necessary to give increased increment of dominant stems.

243. *Opening of the Canopy (Increment Fellings, Overhead Release and Improvement Fellings)*

See also Nos. 1611, 1718–9.

1740. Uniformisation par le haut. **[Crown improvement fellings.]** *Rapp. Inst. nat. Étude agron. Congo belge 1953*, 1954 (247–56). [F.]

[Cf. *For. Abstr.* 15 (No. 3423).] The girth distribution in 20-cm. classes in the Mayumbe blocks H52 and H53 is shown separately for dominants, dominated trees and shrubs, and the 12 valuable species. The successional status of the blocks is discussed. A 1% enumeration was made of the regeneration of dominants, dominated trees and shrubs, lianes, and herbs. In H52 and H53 respectively 14 and 15 named species make up 85 and 77% of the regeneration of large trees. In this the valuable trees are *Gossweilerodendron balsamiferum* (contributing 22 and 25%), *Cistanthera leplaei*, *Hylodendron gabonense*, *Terminalia superba*, *Oxystigma oxyphyllum* and *Guarea cedrata*. The number of stems/ha. eliminated in H52 and H53 respectively are: all non-valuable species > 160 cm. girth—25, 16; all malformed dominated trees + shrubs < 160 cm.—97 + 43, 93 + 29; all lianes —850, 640. Stems/ha. remaining after this treatment are: dominants, 20–160 cm.—270, 289; valuable species > 160 cm.—8·5, 5·5; dominated trees + shrubs, 20–160 cm.—143 + 80 and 125 + 36. Included in the trees/ha. of dominants are 48 and 85 valuable species. In H48, 5 years after the treatment, there are ca. 10 stems/ha. of worthless species > 160 cm., including new recruitment and trees not killed by simple girdling. The enumeration also showed a 72% diminution of stems in 17 species of dominated trees and shrubs, but this covered only stems > 20 cm., and 40% of treated stems had coppice shoots still < 20 cm. girth. The actual mortality in this storey in 5 years was only 30%. Lianes showed 66% mortality, which included most of those reaching the upper canopy. The development of the stand in the last 5 years is shown in girth-distribution tables. It has benefited by the removal of large worthless stems, which has favoured the growth of the medium sizes. The thinning out of the dominated trees and shrubs has reduced competition for the young recruitment and has also favoured the medium sizes. The block is now to have the following removed per ha.:—worthless trees > 160 cm., 9·8; dominated trees, 43; shrubs, 8·6; lianes, 731. *Sterculia tragacantha*, *Antrocaryon micraster* and *Ceiba pentandra* will be double-girdled. *Cynometra* sp. will be poisoned (Ammate 150 g. per m. of girth). All coppice of 1948 girdlings and of lianes will be cut back.

1741. Annélation et empoisonnement. **[Girdling and poisoning.]** *Rapp. Inst. nat. Étude agron. Congo belge 1953*, 1954 (246–7). [F.]

The results of the 1948 simple girdling at Mayumbe, are given in 20% mortality classes separately for trees > 1·6 m. girth (31 spp.) and dominated trees and shrubs (17). Na arsenite and Ammate trials are in train for species particularly resistant to simple girdling. [Cf. *For. Abstr.* 15 (No. 1360).]

1742. **Silvicultural research: thinning.** *For. Res. Notes N.Z. For. Serv.* 1 (11), 1954 (7–8). (*Annual Report of the Forest Research Institute, Rotorua, 1953/54.*)

Experiments showed that where the extraction of thinnings is not feasible, poisoning can be effective and very much cheaper than felling. A few examples of translocation of the poison to crop trees, probably through root-grafts, have been noted, but in such cases the poisons used were strong ones, and it is thought that concentrations can be reduced.

1743. KADAMBI, K., and DABRAL, S. N. **Tests on the efficacy of Fernoxone in killing various forest trees.** *Indian For.* 80 (10), 1954 (653–8 + 3 photos).

The toxicity of Fernoxone (80% Na salt of 2,4-D) to trees has been investigated at Dehra Dun since 1952. Three methods of application were tried: (1) aqueous solution in a frill girdle, (2) aqueous solution in notches spaced out all round the tree, and (3) the chemical inserted in holes, ½ in. in diameter, 3–4 in. deep, and bored downwards and inwards at an angle of 45°, in two staggered rows of 8, about 2–3 ft. from the ground and spaced all round the trees, the holes then being filled with water and sealed. Method (3) proved much the most efficient. Notes are given on the individual species, which are divided roughly into three classes: (*a*) apparently immune: *Alstonia scholaris*, *Albizzia procera*, *Dalbergia latifolia*, *Ficus glomerata* and *F. palmata*; (*b*) affected but not killed outright: *Acrocarpus fraxinifolius*, *Araucaria bidwillii*, *A. cunninghamii*, *Cupressus torulosa*, *Dalbergia sissoo*, *Eugenia jambolana*, *Litsea polyantha*, *Mallotus philippinensis*, *Phoebe lanceolata*, *Shorea robusta* and *Stereospermum suaveolens*; (*c*) readily killed: *Acacia catechu*, *Broussonetia papyrifera*, *Cedrela toona*, *Ficus religiosa*, *Melia azedarach*, *Ougeinia dalbergioides*, *Pinus caribaea* [*s.l.*], *P. longifolia*, *Santalum album* and *Sapium sebiferum*. It is noted that species having latex or exuding gum generally fall into class (*a*), and species yielding turpentine into class (*c*).

245. *Tending of Trees, Pruning etc.*

See also Nos. 2048, 2079–80.

1744. **[Pruning of Hoop Pine.]** *Rep. For. Comm. N.S.W. 1951/52*, 1954 (10).

Preliminary results from pruning experiments showed that Hoop Pine (*Araucaria cunninghamii*) becomes susceptible to severe wind damage if more than 50% of the green crown is removed. Both height and diameter growth are reduced by severe green pruning. Production of persistent lateral shoots is excessive with increased severity of treatment but development of such shoots results only from opening of the canopy.

1745. **Pruning Ponderosa Pine.** *Rep. For. Timb. Bur. Aust. 1953*, 1954 (20).

Two experiments were re-measured. Ponderosa Pine in this investigation has withstood severe annual pruning (leaving only 6–7 whorls of branches at any time) with very little reduction of volume growth and no significant reduction of height growth. Taper in the lowest 20 ft. of the stem has been considerably reduced by the treatment.

1746. BÁRTA, Č. Pokusy s pěstováním bezsukého borového dřeva. **[Experiments in growing knotless Pine timber.]** *Lesn. Práce* 33 (8), 1954 (358–64). [Cz.]

Krotkevič's bud-pruning method was tested on a small scale in Czechoslovakia on Pine planted as 2-year stock near Kostelec in 1946. The area on which the trees were pruned was 0·33 ha. out of a total plantation area of 1·2 ha. The lateral buds were removed in autumn 1951, spring 1953, and early April 1954. In Sept. 1953, the average height of controls was 255·52 cm., and that of pruned stems 264·56 cm. Other data for controls and pruned stems, respectively, were:—Mean height increment: 1952—47·04, 52·97 cm.; 1953—54·87, 65·27 cm. Mean diam., increment 1952—17·88, 21·70 mm.; 1953—10·70, 15·21 mm. Needle length: 1952—67·60, 96·77 mm.; 1953—64·66, 106·25 mm. The assimilating cells of the pruned were larger and contained more chlorophyll than those of the unpruned trees.

1747. KADAMBI, K., and DABRAL, S. N. **Preliminary note on the debudding trials on *Pinus longifolia* in New Forest, with a view to grow knot-free timber.** *Indian For.* 80 (9), 1954 (571–3 + 2 gphs.). 2 refs.

Height growth was not adversely affected by annual bud pruning, but was reduced when bud pruning was done 4 times in the year. Treatment increases the formation of epicormics and becomes increasingly difficult to carry out.

1748. DOOLITTLE, W. **Weevils attracted to bud-pruned White Pine.** *Res. Note. Stheast. For. Exp. Sta.* No. 63, 1954. pp. 2.

In a pruning study at the Bent Creek Experimental Forest, Asheville, N. Carolina, 1·5% of unpruned and 12·5% of bud-pruned trees were damaged by White Pine weevils. In view of increased weevil damage, a tendency to spindly crooked growth and the increased cost of bud-pruning, conventional pruning may be preferable.

25. TREATMENT OF DEFECTIVE, DERELICT OR VERY OPEN STANDS

See also No. 1582.

1749. POPERT, A. H. **Forestry practice in Britain. Restoration of old woodlands.** *Wood* 19 (10), 1954 (408–9).

Advice on treatment of devastated woods; coppice from which the standards have been removed; and open woods of overmature Oak, Beech and Ash.

1750. PÁLL, M. Termelékenységben visszaesett (rontott) erdök feljavítása. **[The rehabilitation of low-yielding (degraded) forests.]** *Erdö* 2 (4), 1953 (252–9, 392, 395–6). [Hu.russ.g.]

Discusses causes of the existence of degraded stands, describes examples existing in the Hungarian forests and recommends measures for their rehabilitation.

1751. HOLLOWAY, J. T. **The logged Podocarp stands of the Longwood Range, Southland.** *N.Z. J. For.* 6 (5), 1953 [1954], (419–35). 2 refs.

The derelict condition of these logged Podocarp lands is demonstrated and an account is given of the scrub hardwood stands that have developed since logging. There are no indications that any second crop of Podocarps will be, or can be, obtained. If these lands are ever to be restored to productivity, exotic species must be introduced. In view of the density of the scrub hardwood growth, this work of restoration will be both difficult and costly; it probably could not, or need not, be undertaken for many years to come. But an early and wide attack on the many problems involved, on an experimental scale, is recommended. *From author's summary.*

26. COMBINATIONS OF FORESTRY WITH AGRICULTURE AND PASTORAL HUSBANDRY (INCLUDING SHELTERBELTS AND THEIR TREATMENT)

261. *Alternate Forestry and Agriculture, Periodic or Temporary Agricultural Use of Forest Land*

1752. MOONEY, H. F. **Report on shifting cultivation in Orissa.** Orissa Government Press, Cuttack. 1951. pp. 22 + 15 photos + 1 map.

262. *Fuel and Fodder Forests*

1753. COUPPIS, T. A. **Village fuel areas, Cyprus.** *Emp. For. Rev.* 33 (3), 1954 (252–5).

A short history of their establishment.

1754. HUNT, T. E. DE LA. **The value of browse shrubs and bushes in the lowveld of the Gwanda area, S. Rhodesia.** *Rhod. agric. J.* 51 (4), 1954 (251–62 + 3 plates). 5 refs. E.M.B.

Presents notes on species of 9 genera producing leaf fodder and 6 species providing edible pods or fruit, with some data on the composition of the fodder.

263. *Irrigated Forests*

1755. LOGGINOV, B. I. Zaščitnoe oblesenie orošaemyh zemelj v zone Južno-Ukrainskogo kanala. **[Protective tree plantations in the region of the south Ukrainian irrigation canal.]** *Lesn. Hoz.* 5 (4), 1952 (7–12). [Russ.]

The establishment of shelterbelts along the canals of the irrigated zone in the Kherson region is discussed with special reference to the choice of species. The latter must take into account the purpose of the belts, i.e. to strengthen the banks of the canals and to keep them well shaded in order to suppress weed growth and to reduce evaporation. Strongly suckering species should be rejected, as they tend to increase water seepage through the sides and bottom of the canal. *Quercus robur* is the most suitable species on account of its height, wind-firmness, large crown, high resistance to injuries, and longevity. Its usual slow growth is considerably improved by irrigation; in the irrigated southern steppes the mean height after 4 growing seasons of Oak planted as 1-year seedlings was 2·7 m. (maximum 4·7 m.), and under these conditions Oak in its early stages is surpassed in height growth only by Birch and *Robinia pseudoacacia* (and perhaps *Acer negundo*) and does not suffer from the competition of other species, even *Gleditsia triacanthos*, although the latter shows exceptionally good growth when irrigated. The Robinia's habit of extending its roots towards the bank and of suckering abundantly from damaged roots makes it unsuitable for planting along canals, although it can be useful in anti-erosion plantations round reservoirs. It is also unsuitable for shelterbelts in the irrigated fields themselves as it harbours aphids which carry a virus disease of cotton. Strongly suckering Poplars should be avoided; of other species 'Canadian' and 'Balsam' Poplars, *Populus nigra* var. *italica*, and *P. alba* var. *pyramidalis* can be useful but should be planted in rows farther away and separated from the canal bank by rows of species with deep root systems. *Acer negundo*, owing to its dense root system, is good for strengthening banks and can be used in the most dangerous places where they are liable to burst. The sunny, warm climate, the long growing season, and the fresh water supplied by the Dnieper, call for an admixture of fruit trees with the species normally used for shelterbelts in the region.

266. *Shelterbelts, Windbreaks*

See also Nos. 1371, 1524, 1587, 1698.

1756. JENSEN, M. **Shelter effect: investigations into the aerodynamics of shelter and its effects on climate and crops.** Danish Technical Press, Copenhagen. 1954. pp. xi + 264. 102 refs. [E.dan.]

Part I (pp. 9–26) gives a brief summary of conditions relating to turbulence, boundary layers, natural wind, mass exchange etc. Part II (pp. 27–52) describes the apparatus used in shelter investigations. Part III (pp. 53–151) deals with investigations of microclimate and crops (direct influence of wind on climatic and growth factors; experimental fields; climatic measurements in the experimental fields; direct effect of shelter on water conditions; thermal effects of shelter; increased yield of sheltered crops; threshold values of climatic factors for agricultural crops). Part IV discusses the aerodynamics of shelter (single hedgerow or screen; systems of hedges or screens; woods and plantations; collective effect of different forms of shelter in a stretch of country). Investigations were carried out in South Jutland and eastern Scania (Sweden). The experimental data are set out in 240 tables and an equal number of graphs, diagrams etc.

1757. BUDYKO, M. I., and POGOSJAN, H. P. Izmenenie klimata prizemnogo sloja vozduha pri melioracii zasušlivyh raïonov. **[Change in climate of the air near the ground, caused by the improvement of drought regions.]** *Priroda, Moskva* 43 (5), 1954 (45–51). 1 ref. [Russ.]

Recent expeditions of Soviet meteorologists and hydrologists to the drought areas of Central Asia and S.E. Russia in Europe have yielded data which can be used for predicting the climatic trend there, as a result of improvements in growth conditions through the establishment of shelterbelts and irrigation works. While it is now almost certain that these measures will result in only a slight increase of rainfall (and snowfall), drought conditions are being improved by (1) a change in the microclimate near the ground, (2) arresting of surface run-off, and (3) conservation of soil moisture. Observations with balloons, smoke, and special instruments in aircraft show that shelterbelts increase the friction in the lowest air layer and promote vertical air exchange at higher altitudes, thus increasing the likelihood of rainfall. The windbreak effect of shelterbelts is explained as occurring through the air eddies near the ground being transformed into minute eddies when entering a (permeable) shelterbelt. An impermeable shelterbelt does not 'comminute' eddies in this fashion.

Irrigation causes a marked increase of the 'radiation balance' (i.e. the difference between the absorption of short-wave solar radiation and long-wave emission from the soil). The former increases because the albedo (reflecting ability) of the moist soil is smaller than that of dry soil, whereas the latter decreases because the soil temperature is lower and the adjacent air layer has high humidity. Evaporation from the irrigation water also lowers the air temperature to some extent.

1758. Lupe, I. Influenţa pădurilor şi a perdelelor de protecţie asupra climei şi recoltelor agricole. **[The influence of forests and shelterbelts on climate and agricultural crops.]** *Rev. Pădurilor* 69 (4), 1954 (170–5). [Rum.russ.]

Gives figures showing the effect of shelter on wind velocity and transpiration of crops within a sheltered area and the increase in production of crops within the sheltered zone (in kg./ha.): wheat 1840 from 750; maize 2865 from 1073; oats 2325 from 700; hay 5870 from 1187; all from the Dobrudja.

1759. Vereščagina, V. V. Lesohozjaïstvennye meroprijatija dlja zaščity drevostoja ot dubovoï listovertki i neparnogo šelkoprjada. **[Silvicultural treatments as protection against *Tortrix viridana* and *Lymantria dispar*.]** *Lesn. Hoz.* 5 (2), 1952 (86–7). [Russ.]

Since insolation stimulates the breeding of *T. viridana* and *L. dispar*, it is recommended that shelterbelts should be sufficiently wide, consist of high trees with large crowns, and have a dense ground vegetation and underwood. The importance of lateral 'walls' of foliage is especially stressed as they reduce side insolation, shade the stems where the *L. dispar* lays its eggs, as well as serving as a nesting ground for birds.

1760. Antropov, T. F. Obrabotka počvy pod lesnye polosy na sklonah. **[Soil cultivation for shelterbelts on slopes.]** *Lesn. Hoz.* 5 (2), 1952 (26–8). [Russ.]

The successful establishment of steppe shelterbelts depends largely on the accumulation and storage of soil moisture, but with the usual methods of cultivation only 30–50% of the annual rainfall (330–450 mm. in the steppe and 450–660 mm. in the forest-steppe zone) is profitably used. This problem is acute on the steep ravine slopes generally used for shelterbelt plantings, which are especially subject to erosion. Good results have been obtained on slopes $> 3°$ by autumn ploughing without turning the furrow-slice (the mouldboard being removed). Trials at the Novosil Experimental Station (Orel district) in 1950, on a 3·5° slope on badly eroded grey forest soil, showed that autumn cultivation to 30 cm. depth by a tractor plough with mouldboards removed, was followed by the formation of a snow cover 30–35 cm. deep and no loss of soil by erosion, compared with 10·5 cm. and the loss of 12·4 metric tons/ha. of soil [period not stated] for part of the slope on which the furrow-slices had been turned as usual. Deep autumn cultivation is not, however, effective against rhizomatous weeds such as couch grass; to get rid of these, deep autumn cultivation should be used in the moister forest-steppe zone only if the ground is winter-fallowed and cultivated in spring with a plough equipped with coulter and subsoiler. In the more arid steppe regions the slopes should be cultivated in the autumn with a plough having its coulter set for a depth of 22–23 cm. and the subsoiler for a depth of 30–35 cm. Deep cultivation without turning the furrow-slice is also useful after harvesting the cover crops sown between the rows of Oak nests, as it assists penetration of late summer rainfall, and the stubble helps in forming a deeper snow cover, which has the added advantage of protecting the young Oak seedlings from frost damage.

1761. Vlaszaty, Ö. A mezövédö erdösávok talajmüvelési és telepítési módszerei. **[Methods of soil cultivation and the establishment of shelterbelts [in Hungary].]** *Erdészeti Tudományos Intézet Évkönyve, Budapest* 2, 1952 (1954), (34–50). [Hu.] From *abstr.* in *Hung. agric. Rev.* 3 (2), 1954 (8–9). [E.] C.G.B.

Discusses different factors (chiefly wind direction and soil structure and composition) governing the establishment of shelterbelts. Describes in detail the preparation and cultivation of sandy, *szik* and shifting-sand soils, and discusses the possibility of their improvement. Lists different species of trees and shrubs suitable for the upper, middle and lower storeys of shelterbelts grown on a number of soil types, and discusses different planting methods.

1762. Šika, A., and Zavadil, Z. Zakládání ochranných lesních pásů síjí žaludů. **[Establishment of shelterbelts by direct sowing of acorns.]** *Práce výzkum. Úst. lesn. ČSR* No. 4, 1954 (235–54). 9 refs. [Cz.cz.russ.g.]

Results of experiments started in 1951/52 on experimental plots at Strnady (Czechoslovakia) show that: (1) winter storage of acorns has a pronounced effect on the rate of seedling growth; it is important not to break off the sprout on pre-germinated acorns with long sprouts; a damaged stem axis on a strongly germinated acorn is more detrimental to future development than a damaged root; (2) of spot, nest, and line sowings, best results (as regards ability of the seedlings to compete with weeds) are obtained by sowing in large seed spots (diam. 60–80 cm.); (3) the height of seedlings increases with the number of seedlings (25, 50, 75, 100) per spot.

268. *Pastured Forests. Grazing on Forest and Open Ranges. Forage Plants etc.*

See also Nos. 2554, 2558.

1763. Susmel, L. Elementi eco-biologici per il riordinamento dei boschi dell'Alto Zoldano. **[Ecological factors involved in the rehabilitation of the woods of the Alto Zoldano [Belluno].]** *Monti e Boschi* 5 (9), 1954 (394–402). [It.f.e.]

The normal composition of these woods has been destroyed by the predominance of Spruce and Larch respectively in Fir and Spruce stands. Possibilities of natural progressive evolution exist, but the whole question of rehabilitation is bound up with that of grazing.

1764. Halls, L. K., and Suman, R. F. **Improved forage under Southern Pines.** *J. For.* 52 (11), 1954 (848–51). 5 refs.

Improved forage species, *Trifolium repens*, *Paspalum dilatatum* and *Axonopus affinis*, can be established under *Pinus palustris*/*P. elliottii* stands without tillage when litter is burned and fertilizer and lime applied. The relation between forage production and b.a./acre, the effect of needle-cast, and the place that grazed sods can have in fire protection are discussed. *From authors' summary.*

1765. Tamesis, F., and Sajor, V. **Forest grazing in the Philippines.** *Philipp. J. For.* 9 (1/4), 1953 (1954), (1–8 + 1 photo + 1 map + 1 dgm.). 7 refs.

1766. Beltram, V. Opuncija kao stočna hrana u dalmatinskom Primorju. [***Opuntia ficus-indica* as fodder in the coastland of Dalmatia.**] *Šum. List* 78 (9/10), 1954 (526–7). [Croat.]

Farmers on the island of Brač feed the fruit to pigs after removing thorns by soaking in boiling water. This is a further reason for recommending the species for sterile stony soils on the islands S.E. of Rab.

1767. Pechanec, J. F., Stewart, G., Plummer, A. P., Robertson, J. H., and Hull, A. C., Jr. **Controlling Sagebrush [*Artemisia* spp.] on rangelands.** *Fmrs.' Bull. U.S. Dep. Agric.* No. 2072, 1954. pp. 36. Price $0·20.

Reviews the various methods of control—burning, ploughing or disking, crushing, grubbing up, and spraying with herbicides, and discusses methods of range management to prevent re-colonization by Sagebrush.

27. ARBORETA. ARBORICULTURE FOR ORNAMENTAL PURPOSES. HEDGES AND HEDGE PLANTS

See also No. 1601.

1768. Fischer, B. Vorkommen und klimatische Bedeutung wärmeliebender fremdländischer Gehölze in der Schweiz. **[Occurrence and climatic significance of warmth-loving exotic woody species in Switzerland.]** *Schweiz. Beitr. Dendrol.* Nos. 2–5, 1950–1953 (7–32; 16–33; 24–49; 30–52). 155 refs. [G.]

Lists in tabular form many hundreds of trees and shrubs, with literature references, and indications of the climatic zones in which they occur, and often the botanical garden etc. where they may be found.

1769. Anić, M. Dendrološka i uzgojna važnost nekoliko starih parkova u području Varaždina. **[The dendrological and silvicultural importance of several old parks in the Varaždin district.]** *Šum. List* 78 (9/10), 1954 (413–33). [Croat.e.]

Describes 11 parks, their tree species and their importance as source of seeds, cuttings, and scions for grafting.

28. HUSBANDRY OF FOREST PRODUCTS OTHER THAN WOOD

See also section 892.

281. *Christmas Trees*

See Nos. 1613, 2079.

282. *Bark Crops*

1770. Hellinga, G. **Problems in maintaining soil fertility in forest plantations with a short rotation.** *Madj. Ilmu Al. unt. Indones.* 110 (1/3), 1954 (59–63). [E.e.] E.M.B.

Plantations of *Acacia decurrens* var. *mollissima* in the mountains of W. Java have been seriously damaged by competition from *Eupatorium pallescens* and by gum-flow caused by Scolytidae and Platypodidae. The decrease in yields from the second and third crop on the same site is attributed to loss of soil fertility as a result of too frequent cropping with taungya crops (the rotation of the Wattle is 6–8 years, and taungya is practised during the first 1–2 years) and to erosion as a result of cultivation. Failures in experimental plantings in E. Java, where the climate is drier and danger of erosion less, are attributed to poor soils, competition from *E. pallescens* and gum-flow. Experiments were made in 1950 in removing *E. pallescens* from poor-quality plantations established in 1948–9. There was a remarkable improvement in quality, and although two treatments were needed to eliminate *E. pallescens*, costs were low because of its value as firewood. Repeated thinnings in Wattle plantations (4–5 in the first 5 years) are needed for a good yield of bark. Comparative yield figures for first, second and third crops on the same site in E. Java are not yet available. In experiments on Mt. Lawu, after the Wattle was felled, *E. pallescens* removed and the site burnt over, dense natural regeneration appeared in about 10 days and the stands look healthy a few years later. Improvement by breeding and the use of artificial fertilizers are discussed. The production of Wattle bark in Indonesia is well below requirements and intensive management is necessary. *Pinus merkusii* needs less intensive management and its soil requirements are low.

283. *Fruit and Seed Crops*

See also Nos. 1431, 1606, 1708, 1724.

1771. Inal, S. Palamut meşesi ormanları coğrafî yayilişlari, ekonomik öenemi ve amenajman esasları. **[Valonia Oak (*Quercus aegilops* L.) forests: their geographical distribution, economic importance and the fundamentals of their management.]** *Tar. Bak. Orm. gen. Müd. Yay.* No. 101, 1953. pp. 326. 113 refs. [Turk.g.]

Reviews the history of Valonia Oak and its use in the tanning industry, and presents data on its systematics, morphology and natural distribution. Ten types are distinguished, and their fruit (cupules) and leaves illustrated. In Turkey, Valonia Oak covers an area of 258,000 ha. or 2·5% of the total forest area, though much of the Valonia forest is unproductive; it extends both into the warm subzone of the *Lauretum* and *Castanetum* and into the steppe zone, preferring a warm climate, but having considerable resistance to cold. Moisture is its most important requirement, not so much with respect to total annual rainfall, as to its distribution throughout the seasons. It prefers a dry summer, is light-loving, and being susceptible to dry north winds in summer, does better on S. aspects. It thrives on all types of soil, but prefers loamy, sandy soils with a low Ca content. It can form an adequate root system on both deep and shallow soils. Pure stands are the most desirable, and mixed

stands should be converted wherever possible. The tree regenerates easily; destruction of the forests is mainly due to the claims of agriculture and to exploitation for firewood. As regards ownership, 83% of the Valonia forests belong to private owners, and 17% to the state. In general the stands are not managed and artificial regeneration is necessary to re-create stands of good quality. Recommendations are made for harvesting and organization of the industry. It would be greatly to Turkey's advantage if analysis and evaluation of export material could be made in Turkey before export, and if the extraction industry could be extended. Valonia forest is of great importance in the Turkish economy. Average yearly production is 61,000 tons, bringing in to the national income ca. 6·71 million Turkish lira based on average prices for the last 5 years. Valonia makes up 48% of the total export value of Turkish forest products, and 78% of the export value of minor forest products. Of the world production of valonia, ca. 75,000 tons, 73%, comes from Turkey. Many of the Turkish forests could, with right management, give twice their present yield. A group selection system is recommended, with artificial regeneration, and felling cycles of 5 years over areas not larger than 50 ha. Improvement of tree quality must be one of the main objects kept in view. Trees must be tended individually and carefully pruned. *From author's summary.*

1772. HARTLEY, C. W. S. **The improvement of natural [Oil] Palm groves [in Nigeria].** *J. W. Afr. Inst. Oil Palm Res.* No. 2, 1954 (8–41 + 5 plates). 9 refs. E.M.B.

The supply of Oil Palm products in Nigeria comes almost entirely from natural or semi-wild Palm groves which cover vast areas of the country. The problem of grove improvement requires detailed study, and careful records are now being kept in Palm groves near Abak and in the 'Palm bush' area near Benin. At the same time, a Palm grove survey, undertaken in Calabar Province, has shown that there is a high proportion (more than 20%) of the low oil-producing *macrocarya* form in this area, and that yields vary with the several types of grove. The factors involved in the improvement of Palm groves are discussed and a pilot experiment, started in a grove at Obio-Akpa, is described.

1773. KOSTERMANS, A. J. G. H. Pohon buah didalam rimba Kalimantan-Timur jang djarang dikenal. [**[*Cubilia cubili*] a lesser-known fruit tree found in the forests of E. Borneo.**] *Rimba Indonesia* 3 (8/10), 1954 (349–51). [Jav.e.]

1774. KALMYKOV, S. Jablonevye lesa južnogo Kazahstana. **[The Apple woodlands of southern Kazakhstan.]** *Lesn. Hoz.* 5 (1), 1952 (39–42). [Russ.]

Woodlands containing *Pyrus sieversii*, one of the main broadleaved species of the mountains of Kazakhstan, cover a total of ca. 3600 ha., with ca 586,000 mature Apple trees, occupying the upper parts of the moister N. and N.E. slopes, starting from 1200 m., above the belt of Walnut woods, and occurring for preference on deep, clay-loam, humous soils. In order to improve the crops it is intended to take sanitary measures in the woods, to prune the crowns, and to graft scions of better varieties on to young trees.

1775. SIPOVIČ, V. V. Rekonstrukcija dikorastuščyh plodovyh Uzbekistana. **[Improvement of the yield of wild fruit trees in Uzbekistan.]** *Lesn. Hoz.* 5 (1), 1952 (46–8). [Russ.]

Wild fruit trees (Walnuts, Apples, Pears, Pistachio, etc.) occupy an area of about 70,000 ha. in the mountains of Uzbekistan; they do not form blocks of woodland but are scattered in groups or as individual trees among other species. The article, based on an investigation by the Central Asian Forest Research Institute in the Aksak-Atin Forest, Tashkent region, describes the occurrence, properties and growth conditions of the fruit species (with two graphs showing the influence of altitude on the growth rate of *Juglans regia* and the size of its nuts), along with measures for improving the crops. [Cf. *For. Abstr.* 12 (No. 3309); 14 (No. 2257).]

1776. KALMYKOV, S. Fistašniki Kazahstana—neispoljzovannyĭ reserv prirodnyh bogatstv. **[Pistachio woodlands of Kazakhstan—an untapped source of natural wealth.]** *Lesn. Hoz.* 5 (2), 1952 (49–53). [Russ.]

Cutting for fuel, grazing, and forest fires, have reduced the once vast Pistachio [*Pistacia vera*] woodlands of Kazakhstan to an area of about 750 ha. with 45,000 trees. It is important to preserve and extend what is left, in view of the value of the nut crop and of the role of these woodlands in soil protection on steep eroded slopes (at altitudes of 700–1100 m.). The Pistachio is drought- and frost-hardy (enduring temperatures of − 41° C.), but needs a dry climate with hot summers and a long growing season, and prefers deep loess soils with a high Ca content. The proportion of ♂ trees being higher than that of ♀s, and their distribution being irregular, artificial pollination and the grafting of branches from trees of the opposite sex have been found useful to improve fruiting. Selection of élite trees to provide seed for plantations is based on 4 criteria affecting nut quality. The seed must be sown direct on the planting site as seedlings do not stand transplanting, owing to the deep root system which develops as early as the first year.

1777. HOFMAN, J. Kaštan jedlý na Lovosicku. **[*Castanea sativa* in the Lovosice area [Czechoslovakia].]** *Práce výzkum. Úst. lesn. ČSR* No. 3, 1953 (307–23). 3 refs. [Cz.cz.russ.g.]

Describes Chestnut stands at Březno and in the Oparno valley (central Bohemia), established in 1827 as nut trees. To-day only one stand remains almost untouched, with 507 cu.m./ha., mean height 19 m., mean diam. 45 cm. The c.a.i. of d.b.h. exceeds that of Oaks. Other stands are mixed with Oak and other species. The forest is, in general, of poor quality.

284. *Crops Tapped for Exudations*

1778. MACHADO, D. PEREIRA. **Improving Portugal's oleoresin yield.** *Naval Stores Rev.* 64 (7), 1954 (8–9, 20–1).

Summarizes briefly the Portuguese Forest Service research programme in new resin-tapping methods,

and breeding for high-yielding trees, and discusses some results obtained up to the present.

1779. Clements, R. W., and Geisey, J. T. **New tool for raising tins installed with double-headed nails.** *Naval Stores Rev.* 64 (6), 1954 (9). [Lake City Research Centre.]

The tool combines a hammer head with a claw and nail-notch, has an adjustable fulcrum and can be used for extracting any type of nail commonly used in the U.S.A. in resin-tapping. It can save considerable labour and costs.

1780. Clements, R. W. **Nail that extra gum profit.** *Naval Stores Rev.* 64 (5), 1954 (14).

Presents figures illustrating the increase in resin yield from trees having nailed gutters as compared with those having gutters inserted by means of broadaxe incisions.

1781. Schopmeyer, C. S. **Small, multiple faces vs. single faces.** *Naval Stores Rev.* 64 (6), 1954 (13). [Southeastern Forest Experiment Station.]

Tests made in 1953 on Slash Pine, using bark freshening and acid treatment with streaks $\frac{3}{4}$ in. high on (1) single faces 10 in. wide and (2) 5 small faces each 2 in. wide, with bark bars of equal width between the faces, showed no significant differences in yield.

1782. Holliman, P. B. **New chemical stimulant for gum naval stores production.** *Naval Stores Rev.* 64 (6), 1954 (14). [Hercules Powder Co., Brunswick, Ga.]

Tests with new stimulants over a number of years have led to the discovery of a promising new chemical, K α-naphthoxy acetate; applied in aqueous solution, containing the equivalent of 10% of α-naphthoxy acetic acid, to weekly bark freshenings, this has produced greater yields than H_2SO_4 from both Slash and Longleaf Pine.

1783. Larson, P. R. **Winter chipping can be profitable.** *Naval Stores Rev.* 64 (7), 1954 (19). [Lake City Research Centre.]

Presents figures for yields from winter tapping of Slash and Longleaf Pine using (1) bark freshenings and acid treatment, and (2) untreated wood freshenings. Freshenings were made during warm spells at about 3-week intervals. Yields were good and no decline resulted in the regular season's yields.

1784. Schopmeyer, C. S., and Larson, P. R. **Predicting yields of gum from measurements of trees.** *Naval Stores Rev.* 64 (7), 1954. (10–1, 17).

Tabulates the mean annual resin yields by d.b.h. and growth-rate classes for 100 trees each of Slash Pine (site index 70 ft.) and Longleaf Pine (site index 65 ft.). Within the range of values recorded in the study, it was found that, on the average: (1) an increase in d.b.h. of 1 in. will increase resin yields by 27 barrels per crop, (2) an increase of 0·01 in. in mean width of annual rings in the last in. of radial growth will increase resin yields by 11 barrels per crop, and (3) an increase of 0·10 in crown-length ratio will increase resin yields by 38 barrels per crop.

1785. Schopmeyer, C. S., and Larson, P. R. **Gum-yield tables for Slash and Longleaf Pine on poorer than average sites.** *Res. Note Stheast. For. Exp. Sta.* No. 69, 1954. pp. 2.

Cf. preceding abstract.

1786. Gordeev, A. V. Harakter i dinamika smoloistečenija u sosny krymskoĭ. [**Nature and dynamics of resin flow in *Pinus nigra* var. *caramanica***] *Derev. lesohim. Prom.* 3 (10), 1954 (9–11). [Russ.] P.R.

Tapping tests in 1949 with four 60-year-old, and in 1952 with ten 30-year-old, trees showed that, irrespective of stand age, the resin flow from a freshening lasts 6–8 days, over 50% of the yield being obtained during the first 24 hours. A distinct correlation was found to exist between mean monthly temperatures and resin yield.

1787. Urlapov, G. G. **Industrial turpentining of Siberian Cedar [*Pinus sibirica*] in Altai.** *Derev. lesohim. Prom.* 3 (6), 1954 (27–8). [Russ.] From *abstr.* in *Chem. Abstr.* 48 (21), 1954 (13238). P.R.

The production of oleoresin was 5, 22, 50, 74, 101 and 130 tons for the years 1948–53, with yields per face of 256, 320, 334, 326, 281 and 344 g., and yields per streak of 19·3, 18·1, 20·0, 20·0, 17·1 and 26·1 g., respectively.

1788. Tolkačev, A. K., and Sinelobov, M. A. **Influence of streak depth on the yield of oleoresin in Pine turpentine.** *Derev. lesohim. Prom.* 3 (5), 1954 (8–10). [Russ.] From *abstr.* in *Chem. Abstr.* 48 (21), 1954 (13238). P.R.

For one group of Pines, with a freshening interval of 3·5 days, the mean yield per streak was 13·3 g. for streak depth 4·8 mm. (4–6 mm.), and 12·2 g. for depth 9·3 (8–11) mm. In another group, when the depth of streak was reduced from ca. 1 to ca. 0·5 cm., the yield increased by ca. 16% for trees with growth rings 0·8–2·5 mm., and by ca. 9% for those with growth rings 0·6–0·7 mm. wide.

1789. Fomincev, K. S. O tehnologii podsočki sosny obyknovennoĭ. [**The tapping of *Pinus sylvestris***.] *Derev. lesohim. Prom.* 3 (7), 1954 (26–7). [Russ.] P.R.

Adduces some local experimental evidence, over 3 tapping seasons (1951–53), to show that, for E. Siberia, ascending faces give better yields and heal better than descending faces. A peak angle of 70° gave a better flow, with less scrape, than one of 60°.

1790. Kolosko, S. I. Iz opyta osvoenija podsočkoĭ sosnovyh redin i edinično yh derevjev. [**Tapping of Scots Pine in open stands and of solitary trees.**] *Derev. lesohim. Prom.* 3 (10), 1954 (22–3). [Russ.] P.R.

Results of industrial tapping in Belorussia show that, even with low stocking, two-storey tapping (i.e. two faces one above the other, not side-by-side), gives a resin yield per man-day, comparable with that obtained from relatively dense stands under ordinary tapping; this is due to a higher yield per freshening (34·7 g. compared with 24·1 g.). The introduction of the two-storey system has been gradually increasing the mean yield per freshening in Belorussia.

1791. Novičić, M. Mogućnosti smolarenja na Deliblatskoj Peščari. [**Possibilities of resin tapping**

in the [Pine stands on the] sands of Deliblato.] *Šumarstvo* 7 (7/8), 1954 (443–7). [Serb.f.g.]

Trial tappings in *Pinus sylvestris* and *P. nigra* suggest that in stands between 20 and 80 years old systematic resin tapping for 5 years before thinning may yield ca. 70 tons resin from a total area of ca. 500 ha.

1792. MOISEENKO, S. I. Opyt zakladki kuljtur bereskleta Maaka posevom. **[A trial in raising *Euonymus maaki* plantations by direct sowing.]** *Lesn. Hoz.* 5 (1), 1952 (23–5). [Russ.]

Compared with *Euonymus verrucosus*, *E. maaki* contains only slightly less gutta in its root bark (average content of gutta 7–8%, individual bushes 25%) but grows considerably faster, develops a larger root system, and is much easier to establish. Trials laid out in 1949–1950 by the Far Eastern Forest Research Institute on soils considered most suitable for this species (fertile virgin forest soils) showed that best results were obtained by autumn nest sowings of freshly collected seed. The fresh weight of roots/ha. (before 2 years' growth had been completed) was 2850 kg. and that of roots $\geqslant 0{\cdot}5$ cm. in diameter, 830 kg. Trials in the Moscow region and in the arid parts of S.E. European Russia showed that *E. maaki* retains its high growth vigour and root production when grown outside its natural range.

1793. MORROW, R. R. **Influence of tree crowns on sap production.** Agricultural Experiment Station, Cornell University, Ithaca, N.Y. [1954]. pp. 16. 8 refs.

A study of three areas of 'sugar bush' [stands of *Acer saccharum*] confirmed the correlation between live crown ratio, crown diameter, sugar % in sap, and sap flow. The results indicate that the aim should be the development of single large-crowned trees with consequent increase of sap production per bucket (which reduces production costs) rather than a certain number of trees or sap production per acre (the latter varying little with crown size).

285. *Leaf Crops*

See Nos. 1575, 2482, 2511.

286. *Osier-growing*

See No. 1496.

287. *Bamboo and Cane Growing etc.*

See No. 2523.

288. *Crops Grown for Animal Products*

1794. MAURIZIO, A. Bäume und Sträucher als Bienenweide. **[Trees and shrubs as bee pasture.]** *Schweiz. Beitr. Dendrol.* No. 5, 1953 (11–9). 27 refs. [G.]

1795. SMITH, F. G. **Beekeeping in the tropics.** *Repr.* from *Bee World* [, *Benson, Oxon.*] 34 (12), 1953 (233–45). 76 refs.

Includes notes on the tropical forest types most important for bee-keeping.

289.4. *Shade Trees for Crops*

1796. MARRERO, J. Especies del género *Inga* usadas como sombra de café en Puerto Rico. **[Species of *Inga* used as coffee shade trees in Puerto Rico.]** *Carib. For.* 15 (1/2), 1954 (54–71). 21 refs. [Span.]

Descriptions of (1) *Inga laurina* and *I. vera*, the most commonly used shade trees for coffee in Puerto Rico, (2) introduced *Inga* spp., that still exist on the island, (3) pests and diseases of shade trees. The present situation in the use of *Inga* species to shade coffee in the island, and silvicultural characters are discussed, and some possible lines of research on shade trees suggested.

3. WORK SCIENCE (WORK STUDIES). HARVESTING OF WOOD: LOGGING AND TRANSPORT. FOREST ENGINEERING

30. WORK SCIENCE (WORK STUDIES): GENERAL

1797. MAKKONEN, O. Metsätöiden vertailevan aikatutkimuksen periaate. **[The principle of comparative time studies in forest work.]** In *Julk., Metsäteho, Helsinki* No. 32, 1954. pp. 18. 13 refs. [Fi.e.]

Discusses differences between methods adopted in Central Europe (especially Germany) and Northern Europe in conducting time studies in the forest, and quotes examples showing the need to make observations on forest workers for at least week in each kind of work studied if results are to be considered reliable. *From author's summary.*

304. *Hygiene. Safety. Accidents and their Prevention*

See No. 2315.

305. *Sequence of Work and Performance (Time and Performance Tables, Evaluation of Work)*

See No. 2038.

307. *Tools, Equipment, Machines and Working Animals: General*

See Nos. 1620, 1650, 1663–4, 1669, 1692–3, 1810.

31. LOGGING AND TRANSPORT: GENERAL

See also Nos. 1577, 1580, 1811, 2090, 2576.

1798. HALL, W. T. **Utilisation and exploitation technique in Scottish forestry, 1854–1953.** *Scot. For.* 8 (4), 1954 (175–87).

1799. KÁLDY, J. Hibák és feladatok a fakitermelés területén. **[Mistakes and problems in felling operations.]** *Erdö* 2 (3), 1953 (212–27, 296). [Hu.g.]

Discusses the need in Hungary for closer co-operation between industry and forestry in order to time the felling season better, a higher standard of work in felling operations, and better use of machines.

1800. KUTASY, V. Erdögazdaságunk feltárása. **[Opening up the Hungarian forests.]** *Erdö* 2 (4), 1953 (360–8, 392, 396). [Hu.russ.g.]

In the past, inaccessible forest areas in Hungary have remained unexploited. Projects for the planned exploitation of these forests are outlined.

1801. WIBSTAD, K. Bjørk—hogst- og transportproblemer. **[Birch—felling and transport problems.]** *Norsk Skogind.* 8 (11), 1954 (410–4). [Nor.e.] P.R.

An account of the practice of Billerud Aktiebolag [Sweden] in securing Birch from its own and other forests, with comparative costs for felling and hauling Birch and conifers.

1802. HOOKER, L. W. **A report on developments in logging [in N. America in 1953].** *J. For. Prod. Res. Soc.* 4 (4), 1954 (27*A*–31*A*). 127 refs.

Discusses changes in equipment and methods, and research and development. Includes a bibliography of logging literature (mainly N. American) for 1953.

1803. **Development of mechanical logging methods between the stump and final landing for Eastern Canada.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1368 (*B*-1), 1954. pp. 3 + 16.

A panel discussion of 17 conditions required. These must permit reduction in cost, increase in productivity, economic operation in all conditions, and continuous use of equipment. They should permit the required silviculture and maximum regeneration, soil and fire protection, multi-product operation, the concentration of by-products otherwise considered waste, the development of a road system, the improvement of living conditions, provision for the disposal of slash, the completion of processing before reaching the final landing, a seasoning opportunity and continuous delivery. Diagrams illustrate full-tree, tree-length and short-wood extraction with the points for processing, handling, inspection and storage.

1804. SCHAEFFER, W. H. **A harvesting technique for beetle-killed Engelmann Spruce on the Western slope of Colorado.** *J. For.* 52 (11), 1954 (860–2). 9 refs.

The recent barkbeetle outbreak almost liquidated Colorado's vast Spruce forests. The approximate economic values of the Spruce/Fir forest were: watershed 3·87, recreational 3·23, hunting and fishing 1·89, grazing 0·804, and timber 0·10$/acre/year. A study of damage in salvage operations, indicated a total loss due to felling and skidding, of 65% of the 'green' trees originally present. Planning on this analysis, a system of main skidding trails suited to the ground and marked by high (30-in.) stumps was laid out, with subsidiaries in a herringbone pattern; the direction of felling was also designated on the ground. Study of the plan in practice indicated a need for better training of the choker-setters and the provision of more high stumps to protect clumps of green trees or reproduction from swinging logs. The total loss of green trees was reduced under this system to 40%, leaving 800 or more trees per acre to ensure future stocking. A simple time study showed increases in volume skidded per day of 65 and 27% respectively with D-6 and D-4 tractors, but other factors will entail a very slight increase in harvesting costs.

32. FELLING AND RELATED OPERATIONS

322. *Felling Season. Preparatory Measures*

See also Nos. 1828, 2161, 2363, 2435.

1805. SMITH, R. F., and MATHISEN, K. **Arsenic content of pulp from chemically debarked trees.** *Tappi* 37 (10), 1954 (451–3). 9 refs. P.R.

Analyses for As in trees treated with Na arsenite, on pulp made from these trees, and on pulp to which arsenite was added at the start of the pulping process, showed that in all cases the As content was considerably below the concentration permissible in food.

1806. **Posts peeled with poison.** *Rep. Tenn. Vall. Auth. 1953/54*, 1954 (3).

Applying Na arsenite in a narrow frill girdle has proved as effective as band girdling [cf. *For. Abstr.* 15 (No. 1400)] on Shortleaf Pine, Scarlet Oak and Black Gum. Chestnut Oak, Hickory and Sassafras did not respond satisfactorily to either type of girdling. Sycamore [*Platanus occidentalis*?] peeled easily after frill girdling, while Virginia Pine and Persimmon showed little promise; these 3 species were not included in the band-girdle test. The 'chemically peeled' posts took preservative treatment similarly to those barked by other methods. Shortleaf Pine posts from the upper part of the tree took up preservative very rapidly and those from butt sections more slowly. Blackgum and Yellow Poplar [*Liriodendron tulipifera*] took up preservative fairly rapidly, probably because of early stages of decay in the wood.

1807. ALLGEMEINE HOLZIMPRAEGNIERUNG G.M.B.H. Procédé pour empêcher la moisissure du bois de hêtre. **[Method of preventing tylose formation in Beech wood.]** *French Patent* No. 1,059,353, March 24, 1954. pp. 2. [F.] P.O.

Introduction of antibiotic chemical compounds ($NaClO_3$, chloral hydrate, alcohols, formaldehyde, HF, trichlorophenol, etc.) kills the parenchyma in standing or felled stems, thus preventing vessel blockage.

323. *Felling and Subsequent Primary Conversion*

See Nos. 1812–27.

33. DEGREE OF UTILIZATION AND WASTE. CLEARING THE FELLING SITE. HARVESTING OF SMALL WOOD

1808. STERNITZKE, H. S. **Alabama's [resinous] stump wood supply.** *Naval Stores Rev.* 64 (6), 1954 (17). [Southern Forest Experiment Station.]

Presents estimates made during 1951–53, based on field measurement of several thousand ¼-acre sample plots taken throughout the State. Supply is estimated at about 10·5 million tons (assuming a 'push-dozer' removal) occurring over 3034 thousand acres. At the present removal rate, supply is adequate for many more years.

1809. ORELL, B. L., *et al.* **Outline for a slash disposal policy in the Douglas Fir region.** *Report, West Coast Forestry Procedures Committee, Western Forestry & Conservation Association, Portland, Ore.* No. 10, 1954 (79–87). 12 refs.

1810. **Clearing scrub regrowth. Novel use for a discarded circular saw.** *Leafl. Dep. Agric. W. Aust.* No. 2166, 1954. (*Repr.* from *Journal of Agriculture of Western Australia, Perth* (*Ser. 3*), 3 (4), 1954 (399–400).)

A 5-ft. sawblade drilled in 2 places to fix a mild steel bar on a short chord (well off centre) and weighted with a log, was tractor drawn through scrub up to 8 ft. high and 2 in. in diam. with successful results in clearing; fuel consumption was 1 gal./acre/ hour.

34. STORAGE IN THE FOREST AND AT LOG DUMPS

See also No. 2362.

1811. COLLIER, R. D., and SILVERSIDES, C. R. **Pulpwood landings.** *Woodl. Res. Index Pulp Pap. Res. Inst. Can.* No. 94 (*B–8–a*), 1954. pp. 67. 22 refs. Price $1·50.

Most of the 20,000,000 tons of pulpwood harvested annually in E. Canada, is moved over snow, stored on ice and floated out. The landings (points of transfer or storage) are (1) the bunches, piles, skidways and cold decks near stump site, (2) intermediate, (3) lake and river ice, (4) bank, and (5) dry chute landings. The construction lay-out, access, and method of stacking for maximum loading efficiency is considered for each of these depots, and their best location and spacing for an even flow of material at least cost is discussed. Methods of increasing the thickness of ice to support larger stacks and heavier vehicles are given.

35. PERFORMANCE MEASUREMENTS FOR DETERMINING PIECE RATES IN FELLING AND RELATED OPERATIONS

1812. VÖRY, J. Puutavaran valmistuksen keskityötulosten määrittäminen tilastoteitse. **[Statistical determination of average work performance in the preparation of timber.]** In *Julk., Metsäteho, Helsinki* No. 32, 1954. pp. 14. 20 refs. [Fi.e.]

An example is given, based on Metsäteho statistics (not yet published in full, because of insufficient material) showing the average performance in cu.m./hour in preparing 2-m. barked Spruce pulpwood in autumn. The standard deviation is 0·078 cu.m./hour or 34% of the average. The curve for the frequency distribution of this material is similar to the normal curve. This example shows that average performance can be determined statistically when the data are sufficiently extensive and accurate. *From author's summary.*

1813. MAKKONEN, O. Paperipuiden minimiläpimitan pienentäminen hakkuutyön palkkauksen kannalta. **[Reduction of the minimum diameter of pulpwood—calculation of logging wages.]** *Pap. ja Puu* 36 (11), 1954 (458–62). [Fi.e.] P.R.

In time studies by Metsäteho on preparing pulpwood 5–8 cm. in diam., 2 m. long, unbarked, it was found that Spruce and Pine require respectively 43 and 35% per bolt of the time for similar bolts > 9 cm. diam. Barked Spruce pulpwood 2 m. long, 6–7 cm. top diam., requires 76% of the time for similar pulpwood > 8 cm. diam. *From author's summary.*

1814. POPE, C. L. **Effect of breakage on felling and bucking costs.** *Timberman* 56 (1), 1954 (70 . . . 76).

Tabulates the results of a study on the relative time and outturn from standing trees and windfalls, and shows the combined effects of cutting time and breakage on piece rates.

1815. GIORDANO, G. Tempi e resa nell'utilizzazione del pioppo. **[Time and yield studies in exploitation of Poplar.]** *Cellulosa e Carta, Roma* 5 (9), 1954 (7–15). [It.f.e.]

A study of working times and yield, by assortments, in the exploitation of a 9-year-old stand of hybrid Poplar (I 214).

36. TOOLS, MACHINES AND EQUIPMENT FOR FELLING AND RELATED OPERATIONS

See also No. 1810.

1816. ILON, B. Barkningsproblemet löst? **[The barking problem solved?]** *Skogen* 41 (24), 1954 (390–1). [Sw.]

The 'Bark-Lasse' (illustrated in photographs), made by AB Bark- og Skogsmaskiner, Malmköping, is a light machine producing barked wood equal in quality to that from larger machines but with, so far, only ½ to ⅓ their capacity. One log is handled at a time; it is rotated and moved forward by two toothed wheels. Barking is by a cutter, immediately over these wheels, pressed against the log by a spring-loaded arm. Barking begins automatically when the cutter, which can be lifted hydraulically, rests on the log. Barking rate varies with the log size but averages 9 m./min. The machine can be powered from the jeep or trailer used to tow it, although a very much lower h.p. would be sufficient. Production in a 7½-hr. day, moving the machine from place to place, was 28·35 cu.m. stacked measure of 2-m. pulpwood. Results with 3-m. wood were almost equally good; longer lengths might cause some difficulty if the logs were crooked, but the machine could easily be adapted for such lengths, or for sawtimber, by using larger wheels for rotating the logs and replacing manual by mechanical log handling before and after barking. Frozen wood can be barked satisfactorily.

1817. PAUSE, H. Betriebsblatt 3. Rundholzablängung. **[Service instructions sheet No. 3. Cross-cutting of roundwood.]** *Holz Roh- u. Werkstoff* 11 (5), 1953 (205–8). 17 refs. [G.g.] P.R.

A referenced account, discussing the machines and tools involved, with output graphs for two-man cross-cut saws and chain-saws, and with average

data of output and energy consumption for different types of saw, and for Spruce and Beech.

1818. Zehnder, J., Weber, A., and Linder, A. **Investigation of the performance of saws by statistical methods.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2167, 1954. pp. 18 + 3 photos + 2 gphs. 4 refs. Transl. by M. Slade from *Mitt. schweiz. Anst. forstl. Versuchsw.* 27, 1951 (1–18). [See *For Abstr.* 14 (No. 374).] Limited distribution. P.R.

1819. Szász, T. Fontosabb hazai fafajokon végzett erdeifürész-kisérletek eredménye. **[Results of experiments with forest handsaws on the more important native species.]** *Erdö* 1 (3/4), 1952 (254–65, 312–3, 319). [Hu.russ.e.]

Saws with and without raker teeth (the latter of Hungarian manufacture) were tested and the results are presented in tables; in particular, the sharpness angle, set, and depth of raker teeth giving the optimum outturn/energy-consumption ratio for conifers and Poplar, Oak, Beech and *Quercus cerris*, the 5 most important timbers; the relative performance of skilled forest versus standard workshop sharpening and setting (the latter now compulsory); and the resistance to cutting of the above 5 categories.

1820. Madas, L. Szovjet villanyfürészek fakitermeléseinkben. **[Soviet electric saws in Hungarian logging work.]** *Erdö* 1 (3/4), 1952 (203–15, 310, 316). [Hu.russ.f.]

Describes the results of trials in Hungary with several models of the Soviet CNIIMÈ K-5 chain-saw [cf. *For. Abstr.* 11 (No. 147)]. They proved useful for laying-in and trimming, as well as felling and cross-cutting. Sharpening was a problem, particularly when sawing hardwoods (which required 3–4 new blades a day) but a general sharpening centre is now under construction. Saw output averaged 50 cu.m./10-hour shift [hardwoods?] at a cost of 3 florins/cu.m.

1821. Drehsler, M. M., and Berezin, V. P. Ručnaja èlektrosučkorezka RÈS-1. **[The RÈS-1 hand-operated electrical branch trimmer.]** *Lesn. Prom.* 13 (10), 1953 (4–12 + 3 photos). [Russ.]

A circular-saw trimmer (illustrated), dimensions 93 × 22 × 13 cm., weight 6·5 kg., cutting speed 23 m./sec., kerf 8 mm., max. diam. of branch cut 12 cm., motor power 1·2 KW.

1822. **Pneumatic chain saw. 'CP-Danarm' portable machine introduced.** *Timb. Tr. J.* 210 (4073), 1954 (124).

The saw, which is produced by J. Clubley Armstrong Danarm Ltd., Abford House, Wilton Rd, London S.W.1, in collaboration with the Consolidated Pneumatic Tool Co., Ltd., 232 Dawes Rd, London, S.W.6, can fell trees up to 46 in. in diam. Performance figures are given including one underwater cutting. Cutting widths are 23 in. or 16 in.; total weight of saw 31 and 27 lb. respectively. An air motor (80/100 lb./sq. in.) powers the saw through bevel gears producing 1500 r.p.m. at final sprocket.

1823. **The 'Jonsereds' chain saw.** *Timb. Tr. J.* 211 (4075), 1954 (473).

A 22-lb., one-man saw, manufactured by Jonsereds Fabrikers AB and imported by Bolinders Co., Ltd., 4 Lloyds Avenue, London, E.C.3, is powered by a petrol unit in which a pre-heated ignition tube replaces sparking plugs, and a direct injection pump replaces the usual carburettor. The saw blade (19 in.) is 'scoop toothed' in special steel. Advantages are easy starting in all conditions, operation in any position without re-setting, perfect idling, simple throttle control, great cutting power (including even ripping) and easy sharpening.

1824. McKenzie, W. M., and Hodgson, R. S. **Project U.9—Studies in wood harvesting and log conversion methods. Progress report No. 22. Experiment U. 9/11. Power chain saw investigations. (Fourth report.)** Division of Forest Products, C.S.I.R.O., Melbourne. 1954. pp. 21 + 3 photos + 1 dgm. + 6 gphs. P.R.

The cutting characteristics of gouge-type chains were studied on a test bench giving controlled cutting conditions. Such chains cut accurately when the heights of the cutting teech and of the depth gauges are accurately controlled. Filing at a greater horizontal angle to the square position reduces the power consumption, but also decreases the cutting rate. Heavy loading of the cutter bar increases the average bite per tooth beyond the depth-gauge clearance. Relationships between power demand and energy used per tooth bite were studied. Reduction of the sharpness angle of the top edge of the cutting tooth increased the cutting rate and reduced the power demand, but at the same time it weakened the edge. *From authors' summary.*

1825. **The proper use of the power saw as a cutting tool. Panel discussion.** *Woodl. Sect. Index Canad. Pulp. Pap. Ass.* No. 1369 (*B-7-c*), 1954. pp. 9 + 6.

Contains papers on: preventive maintenance (*T. K. Stephens*; *T. A. Cowan*); cutting techniques (*C. C. Wright*); crew organization (*L. G. Kerr*; *L. C. Douglass*); and parts supply set-up and service organization (*R. E. Kirkpatrick*; *G. H. Morris*); with discussion.

1826. Jansen, S. Étude économique comparative de trois procédés d'abattage et de tronçonnage. **[Economic study of three methods of felling and cross-cutting.]** *Bull. Inform. Inst. nat. Étude agron. Congo belge* 3 (5), 1954 (275–86). [F.f.]

A cost comparison between hand labour, Atkins equipment (mobile power source and 2 electric chain saws), and P.P.K. chain saws (petrol motor) working on (*a*) clear felling, and (*b*) selective exploitation of useful timber in the Belgian Congo.

1827. Salminen, J. Rankojen varastokatkonta 2-miehen moottorisahalla. **[Cutting stored pulpwood bolts into lengths with a 2-man chain saw.]** *Metsät. Aikak.* 1954 (9), (369–72). [Fi.e.] (Also as *Tied., Metsäteho, Helsinki* No. 102, 1954).

In a study carried out by Metsäteho in spring 1954, bolts 4–10 m. long were cut into 2-m. lengths. Results showed that (1) bundling took 25·5% of the working-site time, sawing 10·1%, throwing on to a pile 31·4%, auxiliary work 8·2% and breaks 24·8%;

(2) a correlation existed between size of bolt and bundle and working time/man, shown by the equation

$$Z = \frac{0{\cdot}56}{x} + \frac{3{\cdot}84}{y} + 13{\cdot}44$$

where x = bolt size and y = size of the bolt bundle (both in unbarked cu.m. solid measure) and Z = working-site time, in man-min./unbarked cu.m. solid measure. Cutting the bolts in bundles was considerably more rapid than cutting each one separately. A 2-man chain saw gives about the same results as a circular saw; the former is usually more suitable for use at the storage site, but the latter is better if cross-cutting is to be followed at once by e.g. mechanical barking. *From author's summary.*

1828. TREMBLAY, J. P. **Some influences of paint mixture in tree marking.** *For. Chron.* 30 (3), 1954 (307–9).

Experiments with the same paint and solvent in different concentrations showed that a 62·5% concentration of paint (1) was far more efficient and economical than a 45% concentration (2). Using a 5-gal. can of paint as a basis for the mixture it was shown that 160% more cords could be marked with 8 gal. of (1) than with 11 gal. of (2). At the same time, performance increased from 54 to 92 cords per man day when using mixture (1).

37. TRANSPORT

372/377. *Land Transport*

See also Nos. 1577, 1590, 1811, 2020, 2555.

1829. FLÖGL, S. Kočna gradijanta šumskih klizina. **[The braking gradient of forest chutes.]** *Glasn. šumske Pokuse* 11, 1953 (239–310). 5 refs. [Croat.g.]

A mathematical analysis.

1830. SOETOPO, M. Pemungatan hasil hutan setjara mekanis di Filipina. **[Mechanical logging in the Philippines.]** *Rimba Indonesia* 3 (5/7), 1954 (187–264). 29 refs. [Jav.e.]

Reports on observations made at the Far Eastern Mechanical Logging Training Centre (F.A.O.) in the Philippines from Oct. 1952 to March 1953 and makes recommendations for Indonesia on yarding, loading and transport methods.

1831. **Tractor log tongs.** *Timb. Tr. J.* 211 (4076), 1954 (653).

The Allis-Chalmers Manufacturing Co. (U.K. distributors Mackay Industrial Experiment Ltd., Faggs Rd., Feltham, Middlesex) have produced a safe, mobile, one-operator loading unit, designed to reduce logging and mill operation costs. The hydraulically-operated lift-tong attachment is fitted to an H.D.15 G. or H.D.20 G., capable of lifting respectively 12,000 and 16,000 lb. to heights of 10 ft. and 10 ft. 8 in. Logs up to 66 in. diam. or a number of smaller logs can be lifted, carried and put down quickly. An interchangeable lift fork allows for carrying, loading and stacking lumber.

1832. KÁLDY, J. Mire tanítanak a szovjet fakitermelési tapasztalatok. **[What Hungary can learn from Soviet experience in logging.]** *Erdö* 1 (3/4), 1952 (183–8, 309, 316). [Hu.russ.e.]

Following a general discussion of problems and their solution in the USSR, and the lessons to be drawn from them for Hungary, an account is given of (1) Hungarian success with the Soviet KT-12 tractor (illustrated) which transported, e.g. over 3400 cu.m. of timber in 1500 work hours, at 11 florins/cu.m. and 4–5 kg. fuel/ton, in Baranya county; it has proved indispensable for continuous working and operates best on a felling area divided into strips 80–100 m. wide, bisected by a 5-m. skidding lane cleared of all growth and stumps; (2) the Janvarets mobile crane (also illustrated), which has a 180° swing and enclosed driver's cabin, can load 12 (stacked) cu.m. firewood in 19 min. (3- to 5-man team) and 100 cu.m. logs (5- to 7-man team) [per shift?].

1833. MATVEEV, G. K., and GOLJCEV, V. A. Traktor KT-12 so streloï na pogruzke lesa. **[The KT-12 tractor with a boom used for log loading.]** *Lesn. Prom.* 13 (12), 1953 (17–8). [Russ.]

Illustrated description of a KT-12 tractor with an A-shaped, 7-m.-long, wooden boom; hoisting capacity 3000 kg., maximum height 4·5 m.

1834. MAARTMANN, H. R. Wire og kabel. **[Wires and cables.]** Skogbrukets og Skogindustriens Forskningsforening, Transportutvalget [Vollebekk]. 1954. pp. 32. [Nor.]

Part 1 consists of descriptions and illustrations of wire and cables of different types and dimensions, and part 2 of tables and graphs for determining the type needed for different uses.

1835. TUFFIER, M. Du choix et de l'entretien des câbles. **[The choice and maintenance of [steel] cables.]** *Bois For. Trop.* No. 37, 1954 (31–45) [F.f.e.span.]

1836. MEŠKALLO, V. M. Pricepnye ustroïstva dlja lebedočnyh ustanovok s nepreryvnym dviženiem trosa. **[Snap hooks for winch systems with a monocable.]** *Lesn. Prom.* 13 (8), 1953 (8–10). [Russ.]

Illustrated description of 4 models of snap hook ('friction-type hooks') designed by the Siberian Forest Research Institute, with a discussion of their merits. Even these, the best, designs of snap hooks present considerable disadvantages compared with fixed hooks.

1837. TIHOMIROV, A. I. Pervyï opyt èkspluatacii lebedok L-19. **[The first performance tests of L-19 winches.]** *Lesn. Prom.* 13 (12), 1953 (10–3). [Russ.]

Lists the performance of 4 winches, the timber skidded in Aug. 1953 averaging 1950 cu.m. in 28 machine-shifts; output per man-shift 4·7 cu.m.

1838. REŠETOV, A. V. Kompleksnoe ispoljzovanie lebedok TL-3 na trelevke i štabelevke ili pogruzke hlystov. **[Combined utilization of TL-3 winches for skidding and stacking or loading tree-length logs.]** *Lesn. Prom.* 13 (12), 1953 (13–6). [Russ.]

Illustrated description of the methods used at the Kazachinsk lespromkhoz (Yeniseiles) for skidding and stacking or skidding and loading (on lorries)

tree-length logs of Pine (with some Larch), using a single petrol-driven TL-3 winch.

1839. Currie, D. V. **The role of the small tractor in the bush.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1379 (*B*-8-*f*), 1954. pp. 9.

Paper [with special reference to E. Canada] and discussion.

1840. Podvjazkin, K. A., and Gračev, V. A. Mehanizacija perekladki uzkokoleĭnyh lesovoznyh usov. **[Mechanization of the re-laying of narrow-gauge forest railway sidings.]** *Lesn. Prom.* 13 (10), 1953 (13–5). [Russ.]

An illustrated description of the KT-12 tractor fitted with a lightweight boom, used for laying and taking up narrow-gauge railways. The boom can be mounted so as to operate either behind or on one side of the tractor, and its weight is 300, or 200 kg., respectively. The dismantling of the track is also speeded up by a roller conveyor secured to a railway flat.

378. *Water Transport*

1841. Diebold, A. J. **River driving 90 years back** *Timber of Canada* 15 (2), 1954 (21–23, 33).

A description (based on an article in the London Magazine of 22 Feb. 1862) of the work with booms, clearing eddies and jams, kedging across lakes, negotiating rapids and navigating rafts with oar and sail down the Grand (Ottawa) River and the St. Lawrence to Quebec.

1842. Karavaev, F. I. Amurskie morskie plotysigary. **[Sea-going cigar-shaped rafts constructed on the Amur river.]** *Lesn. Prom.* 13 (10), 1953 (23–4). [Russ.]

Describes and illustrates sea-going rafts (length 104 m., max. width 12–13 m., max. height 3·5–4·0 m., volume 2800–3000 cu.m.), built since 1951 on the river Amur and capable of being towed in the Sea of Okhotsk.

1843. Tuovinen, A. Paperipuiden uittohukka Kemijoella. **[Pulpwood floating loss in the river Kemi.]** *Pap. ja Puu* 36 (11), 1954 (453–7). [Fi.e.] P.R.

In a co-operative study by Metsäteho and the Kemijoki Floating Association in 1954, test material consisted of 42,760 Spruce and 58,894 Pine, partially barked, 2-m. pulpwood logs. These were launched between 7 May and 4 June, and floating time varied from 26 to 51 days for logs from the lower and from 78 to 81 days for those from the upper parts of the floatway. Weather was relatively favourable. Floating loss in terms of log number averaged 3·75% for Spruce and 3·15% for Pine, but the Spruce logs lost were much smaller and the difference in cu.m. loss was slight. Sinking was an important factor only for logs barked during or after Sept.–Oct. 1953; floating loss in logs barked earlier was probably due to drifting ashore, dynamiting and theft. Unfavourable seasoning may increase floating loss considerably; a Spruce lot barked in Nov. 1953 and launched on 7 May, 1954, showed a loss, mainly by sinking, of 13·5% of the number of logs. [Photographs with English legends show the storing methods used on different parts of the floating system, indicating the floating loss for each.] *From author's summary.*

1844. Šuljc, G. F. Gibkie prodoljnye zapani s nadvodnym raspoloženiem vynosov. **[Flexible longitudinal terminal booms with guy-cables arranged above water level.]** *Lesn. Prom.* 13 (9), 1953 (24–9). [Russ.]

Illustrated description of, and calculation of the forces, angles and cable thicknesses involved in, these longitudinal booms. The guy-cables are above water level, suspended from spars, and form a 45° angle downstream with the current. The counter guy-cables may be either above or below water level (moored to the river bed). The booms are formed by a number of pontoons held in position by the cables and supporting the cribwork. While a transverse terminal boom on a river 250 m. wide and 5 m. deep, with a flow velocity of 2·5 m./sec. necessitates the use of 45 cables of 65 mm. diam. each, a longitudinal boom 60 m. wide on the same river involves only 2 cables of 47·5 mm. for its transverse (collecting) portion.

38. FOREST ENGINEERING

383. *Roads and Bridges*

1845. Partos, A. Erdögazdasági feltáróutak emelkedési viszonyai. **[Forest road gradients [for motor haulage].]** *Erdö* 1 (3/4), 1952 (241–8, 312, 318). 2 refs. [Hu.russ.e.]

Expounds the theoretical considerations (surface friction, fuel consumption/engine revs. etc.) underlying the choice of optimum gradient under different conditions.

1846. Fuják, J. Erdei feltáró-utak építése Bulldoser segítségével. **[Use of bulldozers in forest road construction.]** *Erdö* 1 (3/4), 1952 (249–53, 312, 318). [Hu.russ.e.]

A detailed account of Hungarian experience with a Soviet bulldozer, the C-80 Stalinets, introduced in spring 1950, and currently being used in forest road construction in Transdanubia and the foothills of Vertes, Bakony and Mecsek. Details of the machine (tracked, 180 developed h.p., 3 × 1·20 m. blade) and its performance of different tasks and under different conditions, are given. For skidding, the KT-12 tractor is preferred; for screefing work the Soviet P-3-30-P tractor-drawn plough, the P-P-50 planter and the D-162 cultivator should have preference; the C-60 and C-80 winch-tractors are more suitable for extracting stumps of diameters above 30 cm. The machine does not perform well on stony soils, but as an excavator and grader on the majority of soils it is excellent. Performance and fuel-consumption norms are under study.

1847. Sonnier, J. Un moyen de pénétration des dunes de Gascogne: la piste cimentée cyclable. **[Communications in the Gascon dunes: the concrete bicycle track.]** *Rev. for. franç.* 6 (10), 1954 (591–600 + 1 plate). [F.]

Concrete bicycle tracks (details of construction given) cost only one-tenth the amount of forest roads and afford a useful means of circulation to forest workers, fire-fighters etc. in the sandy forests of the Landes. The extension of the existing network is recommended.

385. *Drainage, Irrigation, Sedimentation. Water Supply*

See also No. 1358.

1848. Huikari, O. Metsänhoitotöiden koneellistamisen nykyvaihe. [**A good start with mechanization of forest work.**] *Metsät. Aikak.* 1954 (8), (303–6). [Fi.e.]

Discusses the use of manual labour, explosives and a new plough [illustrated] for forest drainage in Finland. *From author's summary.*

1849. Den jämtländska dikesfräsen. [**The Jämtland [rotary] ditch digger.**] *Skogen* 42 (1), 1955 (17). [Sw.]

Further illustrations [see *For. Abstr.* 15 (No. 3670)].

4. FOREST INJURIES AND PROTECTION

41. GENERAL TECHNIQUE OF FOREST PROTECTION. TYPES OF INJURY

411. *Natural and Biological Control*

See Nos. 1872–3, 1952–3, 1967, 1972, 1979–80, 1983, 1985, 1987, 1991, 1998, 2010–1, 2015.

413. *Physical and Mechanical Control (Trapping etc.)*

See No. 2005.

414. *Chemical Control*

See Nos. 1954–62, 1965, 1969–70, 1978, 1983–6, 1989, 1994–5, 2006–7.

42. INJURIES FROM INORGANIC AGENCIES OTHER THAN FIRE

421. *Air Currents*

See also Nos. 1581, 1744, 1814.

1850. Lines, R. **Investigations into damage by the gale of January 31st, 1953.** *Rep. For. Res. For. Comm., Lond. 1952/53*, 1954 (47–9).

A preliminary investigation of damage indicated that in winds of such intensity, trees of all species over 45 ft. in height were susceptible to windblow, though Spruce on firm ground tended to be broken off instead of uprooted. Scots Pine suffered badly. Edges of plantations often withstood the gale and recently thinned crops were the most susceptible to blow.

1851. McLintock, T. F. **Factors affecting wind damage in selectively cut stands of Spruce and Fir in Maine and northern New Hampshire.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 70, 1954. pp. 17. 11 refs.

Wind damage to Spruce (*Picea rubens*) and Fir (*Abies balsamea*) during 2–4½ years following varying degrees of selective felling was studied on 5 areas. Damage increased sharply when more than 20% of the total b.a. was removed. Most of the damage to Fir was by breakage and to Spruce by uprooting. Fir was nearly three times as susceptible to damage as Spruce, large trees (over 9 in. d.b.h.) particularly so. Damage increased with increasing size of openings for yards and roads.

1852. Redmond, D. R. **Condition of tree rootlets in Nova Scotia following a hurricane.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (5), 1954 (1).

In order to test the hypothesis that a cause of the decline in vigour of forest trees is damage to feeding rootlets as a result of sway in high winds, the root systems of two Yellow Birch and two Balsam Firs were excavated immediately after the passage of the hurricane 'Edna', in which many nearby trees were broken and uprooted. The soil is a sandy loam and rainfall during the storm was 0·51 in. No broken rootlets were found, and it is unlikely that the theory is valid, at any rate for these species in a sandy loam soil, the type of soil normally occupied by Yellow Birch.

1853. Pitot, A. L'action de l'alizé sur quelques espèces ligneuses dans la Presqu'île du Cap Vert. [**The effect of the trade wind on some woody species in the Cape Verde Peninsula.**] [*Proceedings*] *2ª Conferência Internacional dos Africanistas Ocidentais 1947, Lisbon* Vol. 2, 1950 (285–300 + 15 photos). [F.]

Describes and illustrates some effects of the wind on the growth of *Acacia* (*Faidherbia*) *albida*, *Parinari macrophylla* and *Elaeis guineensis*.

422. *Temperature Influences. Frost. Heat. Drought*

See also Nos. 1348, 1602–3, 1737, 1950.

1854. Kraevoĭ, S. Ja., Oknina, E. Z., and Ipekdžijan, V. M. O vlijanii nizkih kritičeskih temperatur na sejancy duba. [**The influence of low critical temperatures on *Quercus robur* seedlings.**] *Dokl. Akad. Nauk SSSR* 96 (4), 1954 (841–4). 9 refs. [Russ.] [Institut Lesa, and Institut Fiziologii Rasteniĭ im. K.A. Timirjazeva, Akademii Nauk SSSR.] A.P.B.

[Cf. *For. Abstr.* 16 (No. 588).] Gives the results of three experiments, all with first-year seedlings: (1) Well lignified seedlings with well formed terminal buds and in full dormancy were frozen whole at temperatures of −21 to −41° C. [period not stated]. Dead and living tissues were then distinguished by staining with neutral red and, 15 days later, by visual inspection. The root collar proved most sensitive, some damage occurring at −21°, followed by roots (damage beginning at −26°), terminal buds and late main-shoot extensions (−31°), and then older parts of the stem (−36°), thus emphasizing the need to protect the collar and roots. (2) In seedlings (*a*) artificially brought out of dormancy, (*b*) not fully and (*c*) fully dormant, as judged by the condition of the protoplasm, the respective %s of undamaged plants after 20 hours' exposure were: at −21°—0, 0, 100; and at −7° —83, 100, 100. (3) Mineral fertilizers, separately

or in combination, were applied in mid-June to 'nests' of seedlings at rates corresponding to N 60, P 90 and K 60 kg./ha. Through most of the following winter there was no snow cover. Mortality %s were ca. 15 for controls, 10 for P (probably owing to the poor solubility of the superphosphate used) and 7–8 for the remaining treatments (K, NP, NK and PK).

1855. ANDERSON, R. D. **An unusual dieback in Monterey Cypress.** *Aust. Plant. Dis. Recdr.* 6 (3), 1954 (49). I.M.I.

Dieback involving the terminals of branches on the E. side of *Cupressus macrocarpa* was reported in the autumn of 1954 from the Melbourne and Metropolitan Works Farm, Werribee, and later from the South Werribee area. No evidence of insect or fungus damage could be found. The occurrence of hot E. winds during two periods of dry weather in January may be responsible for the condition.

424. *Soil Conditions. Erosion Effects. Nutrient Deficiencies etc.*

See also No. 1657.

1856. BULL, R. A. **Studies on the deficiency diseases of the Oil Palm. 1. Orange frond disease caused by magnesium deficiency.** *J. W. Afr. Inst. Oil Palm Res.* No. 2, 1954 (94–129 + 11 plates). 8 refs. E.M.B.

1857. VOIGT, G. K. **Chemicals applied to soil may harm forest seedlings.** *Rep. Wis. agric. Exp. Sta. 1952/53* Part 1, 1954 (42–3). (*Bull. Wis. agric. Exp. Sta.* No. 510.)

The effect on seedlings of various fungicidal and herbicidal compounds, including aluminium sulphate, calomel, formaldehyde, thiosan, Stoddard oil, allyl alcohol, chlordane, and BHC, was studied in pot cultures. Treated soil was sown with *Pinus radiata* (a sensitive indicator of nursery soil fertility) and, after 2 months, radioactive superphosphate (75 lb./acre) and potassium nitrate (200 lb./acre) were added. The seedlings were analysed for P content after growing for a further 2 months. Although the most marked reduction in growth was caused by heavy applications of the chemicals, normal amounts of some also reduced growth. Thiosan, e.g., caused a decrease of 41% in dry-matter production when applied at the usual rate of 145 lb./acre, and BHC at 1 lb./acre gave similar results. Seedlings grown on soils treated with aluminium sulphate had a low P content because of the reduced availability of P in the soil. There was also a low content of total P in the seedlings treated with BHC, probably because this insecticide harmed the development of the root systems. Formaldehyde and allyl alcohol stimulated growth. Plants stimulated in this way absorbed a greater proportion of radioactive P than plants treated with other compounds. This may be caused by soil sterilization, which would eliminate competing organisms; also the more rapid growth may make the trees more dependent on the applied superphosphate. Chlordane had no injurious effects at either high or low rates of application; calomel was harmless at low rates, but reduced growth at high ones. [Cf. *For. Abstr.* 15 (No. 3673).]

425. *Chemical Influences (Atmospheric)*

1858. DOBROVOLJSKIĬ, I. A. Gazoustoĭčivostj drevesno-kustarnikovyh porod. **[The degree of susceptibility to industrial gases of tree and shrub species.]** *Lesn. Hoz.* 5 (4), 1952 (90–1). [Russ.]

A classification of tree and shrub species into three classes according to their susceptibility to poisonous gases, based on observations in the parks and green belts of the iron-smelting region of Krivoi Rog (Ukraine).

1859. ITO, E. **[A survey of the resistance to salt winds of Japanese Black and Red Pine (*Pinus thunbergii* and *P. densiflora*). An example from typhoon Dynah.]** *Report of the Faculty of Agriculture, Shizuoka University, Iwata* No. 2, 1952 (134–45). 15 refs. [Jap.e.] C.G.B.

In the typhoon on the W. coast of Shizuoka prefecture on 23–24 June, 1952, wind velocity reached 43·8 m./sec., winds were nearly at right angles to the coast, and precipitation was slight. Trees, including *P. thunbergii*, to windward of the first dune were severely damaged, while damage to leeward was much less. The windward side of the trees was worse damaged than the leeward side. Damage to young *P. thunbergii* was less in mixture with *Elaeagnus crispa*, *Miscanthus sinensis* etc.; it decreased inland until, at 1000 m. from the shore, no injury was visible. Damage to *P. densiflora* was visible at distances of 2000–3000 m. from the shore; it was always more severe than in *P. thunbergii*, and almost equalled that in *Cryptomeria japonica* and *Chamaecyparis obtusa*. This probably accounts for the absence of *P. densiflora* from the coasts of S. Japan, where typhoons are frequent, and its presence on the coasts of N. Japan, where they are rare. *From author's summary.*

426. *Electrical and Cosmic Influences*

See also No. 1862.

1860. **Lightning and deaths among Radiata Pine.** *Rep. N.Z. For. Serv. 1953/54*, 1954 (33).

Dying trees in groups of ¼ to ½ an acre were investigated in the Rotorua district. There was no sign of disease or insect attack, but in each case there was evidence of lightning strike within the group of trees now dead. Further work is in progress to establish beyond doubt that lightning is a cause in every case.

43. FOREST FIRES

1861. SHAKESHAFT, E. M., BAXTER, B. F. W., and WOLANSKA, I. G. **References to scientific literature on fire. Part VI, 1952.** *Library Bibliography, Joint Fire Research Organization, Fire Research Station, Boreham Wood, Herts.* No. 5, Part VI, [1954]. pp. 65. 651 references. P.R.

Cf. *For. Abstr.* 15 (No. 3686).

431. *Predisposing Factors and Causes. Fire Danger. Fire Behaviour*

1862. BARROWS, J. S. **Lightning fire research in the Rocky Mountains.** *J. For.* 52 (11), 1954 (845–7). 3 refs.

Over 17,000, or 64% of the fires recorded in the 10 Rocky Mountain States during 1948–52 were due to lightning. Further advance in the already highly organized fire services requires greater knowledge of such fires, which raise special organization problems by peak frequencies, e.g. 400 in 24 hours. A co-operative research programme, supported by some 20 agencies, covers cloud survey for storm build-up, cloud breeding and the mapping of the jet stream (high winds of the sub-stratosphere); analysis of fire-weather records of 150 stations; mobile laboratory observations on relationships of e.g. radiation, soil and air moisture, atmospheric nuclei, and electricity, to lightning; and field tests of methods for preventing or reducing lightning fires, including cloud modification. [Cf. *For. Abstr.* 15 (Nos. 3690–1).]

1863. **How forest fires get started.** *Sth. Lumberm.* 189 (2363), 1954 (31–2).

In a survey by the Tennessee Department of Conservation and the Tennessee Valley Authority of causes of fires in the Cumberland-Morgan county area, where fires are frequent, the following causes were found for 238 fires in 1953: debris burning (range burning, land clearing etc.) 35%; sportsmen 29%; incendiarists 9%; logging 6%; railways 5%; smokers 9%; miscellaneous 7%. Over half of the landowners were indifferent to fires.

1864. FEDRUNOV, V. Izučenie skorosti rasprostranenija verhovyh lesnyh požarov. **[A study of the rate of spread of crown fires [in Pine stands].]** *Lesn. Hoz.* 5 (4), 1952 (66–7). [Russ.]

432. *Prevention and Control*

See also No. 1809.

1865. DAVIS, M. H. **Maintaining an effective organisation to control the occasional large fire.** *J. For.* 52 (10), 1954 (750–5).

1866. MOLINIER, R. Le feu et l'avenir des forêts en Provence. **[Fire and the future of the forests in Provence.]** *Revue générale des Sciences pures et appliquées, Paris* 60 (7/8), 1953 (199–208). [F.] L.S.

Discusses the causes of forest fires in relation to the vegetation of the Maures, and the possibilities of fire control by the extension of agricultural land and of Chestnut stands (comparatively fire-resistant), creation of roads on high ground and not in narrow defiles which are easily crossed by fire, and maintenance of efficient firebreaks.

1867. **Capacities of and pressure losses through reeled and unreeled small-diameter hoses.** *E.D. Rep. U.S. For. Serv.* No. 28, 1954. pp. 12 + 7 gphs.

1868. ROSE, G. R. F., MITTON, M., GARDNER, B. J., and BAYLEY, C. H. **The incidence of microbiological damage in unlined flax forestry fire hose [and its prevention].** *For. Chron.* 30 (3), 1954 (274–9). 6 refs.

434. *Revegetation etc. of Burnt Areas*

See No. 1720.

435. *Benefits of Fire Control. Injurious Effects of Fire. Fire Losses*

See No. 2566.

436. *Beneficial Effects of Fire. Uses of Fire in Silviculture and Other Forms of Husbandry*

See also No. 2047.

1869. SCHMITZ, A. Note sur l'expérimentation forestière portant sur l'effet du feu dans le Haut-Katanga (Congo Belge). **[Experiments on the effect of fire in Upper Katanga (Belgian Congo).]** *[Proc.] Ist Conf. for. inter-afric., Abidjan 1951*, 1952 (401–12). [F.]

The local climax is closed forest containing *Parinari excelsa* and *Erythrophleum guineense*, and the local *Brachystegia* forest is a fire para-climax which can be transformed into the true climax by (*a*) complete protection (very difficult to maintain) or more slowly by (*b*) early burning, which is not only more secure but effects a useful thinning of coppice shoots and seedlings, reduces grass competition, and stimulates germination in some species. A table compares the effects on stem number, in 30-cm. girth classes, of 6 years under treatments (*a*) and (*b*) with that of (*c*) late burning. In the girth class groups 0–60, 60–120 and 120+ cm. for (*a*) and (*b*) there are increases of the order of 26, 23 and 2% respectively, while the corresponding %s for (*c*) are − 47, − 24 and + 1·5. The more conservative treatments also raise the proportion of desirable species, while abandonment to the normal run of wild fires actually increases the numbers of useless stems of e.g. *Uapaca* sp.

1870. Essais de brûlage. **[Burning experiments [at the Keyberg Experiment Station, Katanga].]** *Rapp. Inst. nat. Étude agron. Congo belge 1953*, 1954 (397–8). [F.]

Gives notes and a table showing the number of stems (0–59, 60–119, ⩾ 120 cm. girth) in 1953 compared with 1951 and 1945, in 8 plots subjected to complete protection, early and late burning. Early burning is better and safer than complete protection, though one plot showed the dense young regeneration killing out the older trees. Late-burned plots regressed rapidly and *Marquesia* sp., once the sole constituent of the ⩾ 120 cm. class, is on the way out.

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

441. *Weeds*

See also Nos. 1727, 1741–3, 1770, 1857.

1871. BROWN, J. M. B. ***Rhododendron ponticum* in British woodlands.** *Rep. For. Res. For. Comm., Lond. 1952/53*, 1954 (42–3 + photo).

In view of the importance of *R. ponticum* to the restocking of derelict and cut-over woodlands, an investigation of its distribution and ecology has been undertaken. Preliminary observations indicate that the seeds are minute—16,000/g. or 7 million/lb. Dispersal for a distance of 50 ft. (15 m.) has been recorded in open woodland, and more than 150 ft. (nearly 50 m.) from 12-ft. bushes in the open. Seed

dispersal is evidently the means by which *R. ponticum* spreads over new ground, whereas vegetative spread by layering is mainly of importance in increasing the ground cover of established colonies. Coppice shoots are produced with great freedom, and when the top is cut, burnt, or destroyed by chemicals, many fresh sprouts usually appear from the base. Autumn frosts appear to be damaging in some years on unprotected sites. A temperature of 25° F. (−4° C.) maintained for 16 hours killed foliage and unopened buds of potted plants. The late opening of the buds in spring affords sufficient protection against spring frosts in most years.

1872. **Mauritius. Review of agricultural entomology during the period 1948–1954.** *Report, 6th Commonwealth Entomological Conference, London* 1954 (281–4). 7 refs.

Includes a report on the control of *Cordia macrostachya* by *Schematiza cordiae* [cf. *For. Abstr.* 13 (No. 2246)]. *Cordia* scrubs have now either completely disappeared or been much reduced in all regions except a few areas in the south-west of the island.

1873. **Manuka blight.** *Proc. 6th nat. Weeds Conf. N.Z. 1953* (38–58). O.R.E.

[Cf. *For. Abstr.* 12 (Nos. 2321–2).] A collection of papers on problems connected with the natural control in New Zealand of Manuka (*Leptospermum scoparium*) by *Eriococcus* sp. The following aspects are dealt with: the causative organism of the blight (*J. M. Hoy*), its history and incidence (*T. C. Sewell*), a farmer's view (*L. C. Gardiner*), a soil conservator's view (*D. A. Campbell*), a forester's view (*F. W. Foster*) and an agriculturist's view (*C. J. Hamblyn*). The forester's paper lays particular emphasis on the value of Manuka as a pioneer species and as a nurse for natural forest regeneration.

1874. BOUGARD, M. Considérations sur l'utilisation du Debrousol dans la lutte contre les plantes adventices ligneuses et semi-ligneuses (broussailles) en sylviculture. **[The use of Debrousol for the control of woody and semi-woody weeds.]** *Bull. Soc. for. Belg.* 61 (7; 8/9), 1954 (307–22; 362–73 + 4 photos). [F.]

A detailed report on experiments carried out in Belgium and Luxembourg in 1951, 1952, and 1953 on the use of Debrousol, a new formulation of Brushkiller (based on 2,4,5-T) specially adapted for selective treatments. The particular objects of study were: the best season for treatment, the relative susceptibility of different species; the possibility of selective treatment in order to preserve certain species; and the practical possibility of use in the forest. The present report gives general results but not detailed figures for each experiment.

Best results on whole plants were obtained by spraying in summer; best results on regrowth were obtained by cutting back in the spring and spraying either immediately or when the shoots were 10–25 cm. high. Paraffin-oil solutions were rather more effective than water solutions but, in view of danger and expense, water is to be preferred. The relative susceptibility of a number of species to different forms of treatment is given in a table. Conifers were, on the whole, very resistant, and so was *Vaccinium myrtillus*; all other broadleaved shrubs and trees were susceptible in varying degrees. In view of the varying reactions of different species to methods and season of application and dosage, the possibility of selective use of the herbicide is discussed. Various possible uses (cleaning cut-over forest before planting, cleaning pasture, cleaning coppice, release of natural regeneration and young plantations, and suppression of woody vegetation on forest rides, firebreaks, skidding tracks etc.) are detailed.

1875. **Destruction of forest weeds.** *Rep. For. Adm. Malaya 1953*, 1954 (11).

Various treatments of *Eugeissona triste* and *Gleichenia linearis* with 2,4-D, 2,4,5-T, and C.M.U. (3-*p*-chlorophenyl 1, 1-dimethylurea) were tried without success. Recovery of woody climbers after cutting was studied, and 61 % were found to have coppiced with an average length of 5½ ft. at one year; some regrowth was more than 20 ft. long.

1876. **Gorse control.** *Proc. 6th. nat. Weeds Conf. N.Z. 1953* (94–101). O.R.E.

Papers giving the results of trials in the control of Gorse [*Ulex europaeus*] by blanketting an area with a vertical falling spray (*A. Brodie*), low-volume spraying (*J. F. Till*), and cutting and burning followed by spraying (*A. A. Duncan*). [Cf. *For. Abstr.* 13 (No. 1225).]

1877. SKERMAN, P. J. **The Brigalow country and its importance to Queensland.** *Journal of the Australian Institute of Agricultural Science, Sydney* 19 (3), 1953 (167–76). 4 refs. L.S.

Brigalow (*Acacia harpophylla*) originally occupied a 23-million-acre belt extending from N. to S. in Queensland, from Collinsville to the New South Wales border. On fertile soil in scrub associations it grows very erect to a height of some 60 ft. In open associations it attains some 25–35 ft., whereas on poorer soils it may develop a dense understorey of whipstick Brigalow ca. 10–15 ft. high. Notes are presented on the ecology of the Brigalow scrub, its distribution, geology and soils, and on the clearance and use of the area for farming. The region is still in need of further development and some initial success has been obtained by the Department of Agriculture and Stock in clearing this scrub by aerial spraying. A 2,4-D/2,4,5-T mixture at a rate of 2–3 lb. acid equivalent/acre gave good results. Costs were ca. £3/acre.

1878. KADAMBI, K., and DABRAL, S. N. **Preliminary note on the use of Butyl Ester in eradicating Lantana.** *Indian For.* 80 (9), 1954 (574–6).

The results of experiments indicate that Butyl Ester (a mixture of 2,4-D and 2,4,5-T) can be sprayed effectively to kill Lantana, without the bushes having to be cut back first.

1879. GOOR, C. P. VAN. De bestrijding van bunt (*Molinia caerulea*) op kaalkapterrein. **[The control of *M. caerulea* on clear-felled sites.]** *Ned. Boschb.-Tijdschr.* 26 (10), 1954 (269–70). [Du.g.] (*Korte Meded. Bosbouwproefsta. T.N.O., Wageningen* No. 23.)

Trials by the Bosbouwproefstation T.N.O. showed that the Na salt of TCA at the rate of 100–250 kg./ha. in 1000 litres water, effectively killed *M. caerulea*.

Old and young Scots Pine were killed, and only clear-felled areas should be treated; planting should not be done earlier than 3 months after spraying. The layer of dead grass on the soil prevents drying out or deterioration of the soil structure.

442. *Parasitic (Higher) Plants. Climbers and Epiphytes*

See also Nos. 1579, 2050.

1880. HAWKSWORTH, F. G. **Observations on the age of Lodgepole Pine tissues susceptible to infection by *Arceuthobium americanum*.** *Phytopathology* 44 (9), 1954 (552).

Presents evidence to show that *A. americanum* is capable of establishing itself on Lodgepole Pine, through unwounded bark, on tissues over 60 years old.

1881. ROTH, L. F. **Distribution, spread and intensity of dwarf mistletoe [*Arceuthobium americanum*] on Ponderosa Pine.** *Abstr.* in *Phytopathology* 44 (9), 1954 (504).

Presents the results of a survey made on 640 acres in Oregon. The study is being made as a basis for control experiments and stand-management recommendations.

1882. GILL, L. S. **Dwarf mistletoe of Ponderosa Pine in the Southwest.** *Sta. Pap. Rocky Mt. For. Range Exp. Sta.* No. 14, 1954. pp. 9 + 3 photos + 3 sets of drawings + 1 gph. 6 refs.

Arceuthobium vaginatum f. *cryptopodum*, the dwarf mistletoe attacking *P. ponderosa* var. *scopulorum* in the S. Rocky Mountains and Southwestern States is described, and its effect and control by chemical or physical methods are discussed. [Cf. *For. Abstr.* 15 (No. 3707).]

1883. KUIJT, J. **Dwarf mistletoe on Grand Fir.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (5), 1954 (2).

Several trees of *Abies grandis* along Kootenay Lake, British Columbia, were found to be infested with *Arceuthobium douglasii*. This appears to be the first report of mistletoe on a true Fir in Canada.

1884. **Mistletoe control.** *Rep. For. Timb. Bur. Aust. 1953*, 1954 (22).

Investigations into the control of *Loranthus* on *Eucalyptus* spp. were continued [cf. *For. Abstr.* 16 (No. 620)]. Injections of 10% 2,4-D gave best results on *E. polyanthemos*, and 5% 2,4-D on *E. robertsoni*. Measurements of untreated infested trees showed an average reduction of 26% in basal-area increment.

443. *Fungi and Bacteria*

See also Nos. 1444–9, 1579, 1677–8, 1796, 1857.

1885. PEACE, T. R. **The control and avoidance of forest tree diseases.** *Rep. For. Res. For. Comm., Lond. 1952/53*, 1954 (62–70).

The danger of the introduction of Chestnut blight, Oak wilt, and Elm phloem necrosis, and the means to be taken to prevent their entry, are discussed. The possibility of control of tree diseases by eradication is discussed with special reference to Elm disease and sooty bark disease of Sycamore Maple. Varietal and clonal selection for disease avoidance is discussed; apart from the testing of Poplar for resistance to bacterial canker, which is dealt with at some length, work on clonal resistance is still in the very early stages. Autumn dieback of young conifers caused by *Botrytis*, which is proving hard to control, and the possibility of avoiding attacks of *Keithia thujina* by growing *Thuja* in isolated nurseries, are discussed. Disorders that are at present imperfectly understood and for which control measures are yet undiscovered are top-dying of Norway Spruce, group-dying of Sitka Spruce, and bark die-back of Beech.

1886. GÄUMANN, E. **Toxins and plant diseases.** *Endeavour* 13 (52), 1954 (198–204). 15 refs.

Enlarges on the general theme that micro-organisms are pathogenic only if they produce toxins. Examples of those with short-range action (the tissues affected being juxtaposed to the foci of infection) are *Pseudomonas* and *Alternaria* on Solanaceae, and *Stereum frustulosum* on Oak. Long-range toxigenic pathogens, like tetanus in man, are represented in plants by important 'wilt' diseases: *Fusarium spp.* on banana, cotton and tomato; *Endothia* on Chestnut; species of the *Valsa* group on Apricot; *Gibberella* on rice, and *Nectria* on deciduous trees. The constitution and mode of action of toxins isolated is discussed. Following the present pattern of diphtheria therapy it may eventually be possible to cure diseased plants by dosing them with substances that will render the toxins concerned innocuous. [Cf. *For. Abstr.* 15 (No. 1515).]

443.2. Diseases of Seed and Seedlings; Damping Off etc.

See also No. 1668.

1887. VAARTAJA, O. **Microflora on the surface of seedlings as affected by thiram.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (4), 1954 (3).

Thiram has been found to be favourably selective in its toxic effects on soil microflora. Cultures of parts of seedlings grown in thiram-treated soil confirmed this, showing a great increase in % of bacteria and decrease in fungi compared with those grown in untreated soil. There is moreover some evidence that mycorrhiza-forming fungi are relatively resistant to thiram.

1888. VAARTAJA, O. **Screening fungicides non-toxic to germinating tree seed.** *Abstr.* in *Phytopathology* 44 (9), 1954 (509).

Most of 65 chemicals tested by a Petri-dish method were either ineffective against *Rhizoctonia solani* and *Pythium* spp. or toxic to seeds (*Pinus banksiana* and *Betula verrucosa*) at effective concentrations. Certain chemicals allowed maximum germination and development of seedlings despite the presence of the pathogen. Nabam, zineb, ferbam, Manzate, Vancide-51, Spergon (chloranil), lindane, heptachlor, boric acid, benzoic acid, oxyquinoline, malachite green, lauryl sulphate and Thiolutin performed well at certain concentrations. Thiram, captan, and especially Rimocidin were

outstanding, giving good protection at widely varying concentrations. Actidione, gladiolic acid, and Helixin gave fair or good results with *B. verrucosa* but were mostly toxic to *P. banksiana*. Gladiolic acid, streptomycin and Bordeaux mixture were quite effective against *Pythium* sp. but less so against *R. solani*. Trinitrotoluene gave good control, but this was partly indirect as it encouraged growth of antagonistic *Trichoderma* contaminants.

1889. IGMÁNDY, Z., MILINKÓ, I., and SZATALA Ö., JR. Vizsgálatok és védekezési kísérletek a fenyöcsemetedölés leküzdésére. **[Investigations on the damping-off of conifer seedlings and its control.]** *Erdészeti Tudományos Intézet Évkönyve, Budapest* 2, 1952 (1954), (210–26). [Hu.] From *abstr.* in *Hung. agric. Rev.* 3 (2), 1954 (12–3). [E.] C.G.B.

Investigations made by the authors in 1952 showed that the most frequent cause of damping-off of conifers is *Fusarium*, five strains of which were isolated. The pathogenicity of *Rhizoctonia solani* was also established. While *Fusarium* causes the most serious damage at 22–24° C. and produces normal damping-off, *Rhizoctonia* infects the germinating seed and its optimum temperature is 12–14° C. Autumn, winter, and early spring sowing, and use of subsoil as a seed covering, were found to give good results in control of damping-off; chemical control tests were inconclusive.

1890. ŠUMANOV, E. A. O novom zabolevanii sejancev duba. **[A new disease of Oak seedlings.]** *Dokl. Akad. Nauk SSSR* 93 (1), 1953 (189–92). 1 ref. [Russ.] A.P.B.

Describes a damping-off disease prevalent in the Tellerman forest and elsewhere in Voronezh. Cultures from diseased seedlings revealed the presence of usually mixed infections by *Alternaria tenuis*, *Fusarium argillaceum* and *F. angustum*, *Pestalozzia truncata*, *Aposphaeria* sp. and various bacteria. Trial sowings of acorns inoculated from cultures of these, showed the *Fusarium* spp. to be by far the most pathogenic. Inoculations with a single fungus species gave more severe infections than inoculation with two species in combination except for *Fusarium* + *Alternaria*, which killed 80% of the seedlings from acorns so inoculated.

1891. BINGHAM, F. T., and ZENTMYER, G. A. **Relation of hydrogen-ion concentration of nutrient solution to *Phytophthora* root rot of Avocado seedlings.** *Phytopathology* 44 (11), 1954 (611–4). 19 refs.

Root rot of seedlings occurred in all inoculated solutions of pH 3·5 to 8·0. At pH 3 there was no development of the fungus and the rate of rot development decreased markedly from pH 6 to 3·5. It was somewhat slower at pH 8 than at 6. The type of N (NO_3 or NH_4) had no effect on rot development at any pH level. *From authors' summary.*

1892. KELLER, J. R., and POTTER, H. S. ***Thielaviopsis* associated with root rot of some ornamental plants.** *Plant Dis. Reptr.* 38 (5), 1954 (354–5). 3 refs. A.P.B.

Root rot was observed in 2-year *Ulmus americana* growing in greenhouse conditions. A complex of fungus organisms was found in the roots. The most prominent were various thick-walled oöspores resembling those produced by either *Phytopthora* or *Pythium*, chains of dark barrel-shaped spores tentatively identified as the chlamydospores of *Thielaviopsis basicola*, and masses of intercellular medium. This is the first record of *T. basicola* associated with root rot of Elm.

1893. MEJIA, A. S. ***Sclerotium* wilt of Supa (*Sindora supa* Merr.).** *Philipp. J. For.* 9 (1/4), 1953 (1954), (119–29 + 2 plates). 8 refs.

The causal agent is tentatively identified as *Sclerotium rolfsii*.

1894. ROLDAN, E. F., and ANDRES, P. P. **Bacterial wilt of Teak seedlings (*Tectona grandis* Linn.).** *Philipp. J. For.* 9 (1/4), 1953 (1954), (133–43 + 2 plates). 8 refs.

A complete description of the disease is given. The causal organism is provisionally named *Pseudomonas tectonae* sp. nov.

1895. ROLDAN, E. F., and LUCZON, C. U. ***Phytophthora* blight of ornamental Palmera Palm seedlings (*Chrysalidocarpus lutescens* Wendl.).** *Philipp. J. For.* 9 (1/4), 1953 (1954), (43–55 + 2 plates). 11 refs.

The causal agent has been identified as *Phytophthora palmivora*.

1896. HESS, C. E. **Black mold [*Chalaropsis thielavioides*] appears on evergreens [*Cryptomeria japonica, Juniperus virginiana, Thuja* spp.].** *Amer. Nurserym.* 100 (8), 1954 (36–7).

This mould fungus, not previously recorded on Coniferae, caused serious loss of grafts in U.S. nurseries in the 1954 season.

1897. SHIDEI, T., SHIODA, I., and KODAMA, T. **[The influence of fertilizers on needle blight of *Cryptomeria japonica* (Sugi) seedlings in the nursery.]** *J. Jap. For. Soc.* 36 (8), 1954 (214–6). 4 refs. [Jap.e.]

Fertilizer experiments in nurseries on volcanic ash soils showed that increasing the ratio of K_2O, or using a balanced fertilizer, reduced the damage; P_2O_5 and Ca had less effect, and excessive amounts of N fertilizer increased the damage. *From authors' summary.*

1898. PŘÍHODA, A. Sypavka modřínu, způsobená houbou *Meria laricis* Vuill. **[Larch needle-cast caused by *Meria laricis*.]** *Lesn. Práce* 33 (8), 1954 (364–8). [Cz.]

Describes the fungus and its appearance in 3 places in Czechoslovakia in July, 1953; it attacked 1- and 2-year seedlings of *Larix*.

1899. KALANDRA, A. Sypavka borová—lophodermiosa borovice lesní—a boj proti ní. **[The Pine needle-cast caused by *Lophodermium pinastri* and its control, with special reference to attacks on Scots Pine.]** *Lesn. Knihovna (malá Řada)* No. 44, 1954. pp. 49 + [1]. 58 refs. [Cz.cz.] Price *Kčs.* 3·45.

Deals with the different Pine hosts of the fungus, its morphology and biology, different stages of attack, damage caused, and the recovery of attacked trees. Trials are advocated to discover possible resistant strains of *Pinus sylvestris*. Methods are described of preventing the introduction of the disease to areas

free from it, and the increase of infection in areas already affected. Control measures advocated include treatment with Bordeaux mixture, suitable fertilizer, and use of older, taller planting stock.

1900. ***Lophodermium pinastri*** **[on dense young regeneration of *Pinus radiata*].** *For. Res. Notes N.Z. For. Serv.* 1 (11), 1954 (13). (*Annual Report of the Forest Research Institute, Rotorua, 1953/54.*)

A severe outbreak of this needle-cast fungus occurred in the central North Island, *P. radiata* being most affected. Damage was worst in valleys and on shaded firebreaks. Heavy mortality to shaded trees of dense young regeneration resulted, with considerable benefit to the remaining trees. The attack is attributed to the cool wet summers and mild wet winters of the preceding 2 years.

443.3. Diseases of Older Stages

1901. BIRAGHI, A. **Some important diseases of conifers in Italy.** *FAO Plant Prot. Bull.* 2 (11), 1954 (166–7).

Phaeocryptopus gäumannii on *Pseudotsuga taxifolia*, first recorded in Italy in 1952; *Melampsora pinitorqua* on *Pinus* spp., first recorded in Italy in 1950; and *Chrysomyxa rhododendri*, particularly severe after unusually rainy summers in 1952–4 on *Picea abies* growing near *Rhododendron* spp.

1902. BULL, R. A. **A preliminary list of Oil Palm diseases encountered in Nigeria.** *J. W. Afr. Inst. Oil Palm Res.* No. 2, 1954 (53–93 + 18 plates). 38 refs. E.M.B.

With a key for field identification of the principal diseases.

Stem, Butt and Root Rots; Root Diseases

See also Nos. 1427, 1737, 1920, 2579.

1903. DAVIDSON, A. G., NEWELL, W. R., and COCHRANE, R. H. **Decay of Balsam Fir in the Maritime Provinces of Canada.** *Pulp Paper Mag. Can.* 55 (9), 1954 (134 . . . 144). 9 refs.

Variations in the amount of cull were found between different localities (4 mainland, 1 on Cape Breton and 1 on Nova Scotia). Differences in age may account for some but not all the variations. Other possible causes of variation (e.g. fungi present) are discussed. Further studies are needed.

1904. FOSTER, R. E. **Decay of Alpine Fir in the Upper Fraser region.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (5), 1954 (3).

Trees having forked stems or bearing visible sporophores were found to be completely defective, and accounted for 26% of the total number of cull trees. Only 8% of trees free from butt rot were highly defective elsewhere in the stem, while 60–76% of trees with butt rot were culled for excessive defect. Trees ⩾ 16 in. d.b.h. were in general defective. No serious decay was found in even-aged stands ⩽ 100 years old.

1905. THOMAS, G. P., and THOMAS, R. W. **Studies in forest pathology. XIV. Decay of Douglas Fir in the coastal region of British Columbia.** *Canad. J. Bot.* 32 (5), 1954 (630–53 + 10 photos). 13 refs. O.R.S.

An investigation of Douglas Fir in coastal British Columbia has shown that decay losses in old-growth stands are low, amounting to 2·6 and 7·3% of the gross volume of living, and combined living and dead, stems respectively. Twenty-five decay-producing fungi were isolated from living and 29 from dead trees, the most important being *Fomes pini*, *F. pinicola* and *Polyporus schweinitzii*. Irregularities in occurrence of fungi and of decay were traced to influences of site, tree age and size, latitude, and stand history. Root infections were the most frequent, but branch-stub infections caused the greatest average amount of decay. An examination of tree abnormalities showed that some, especially sporophores and swollen knots of *F. pini*, are useful decay indicators. A separate analysis of dead trees has shown that they occasionally form a high % of the stands and that much of their wood is sound. *From authors' summary.*

1906. ETHERIDGE, D. E. **Occurrence of a purple agar-staining fungus with decay in Alberta.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (4), 1954 (3–4).

A fungus identified as *Coryne sarcoides* is becoming increasingly prominent in association with various decays and stains in numerous coniferous and broadleaved hosts and has been reported from every major forest region in Canada.

1907. PLASMAN, A. Note sur la pourriture rouge du mélèze du Japon (*Larix leptolepis* Gord.) causée par *Fomes annosus* Fr. (= *Ungulina annosa* Fr. Pat. = *Trametes radiciperda* Hart). **[Notes on red rot of Japanese Larch caused by *F. annosus*.]** *Parasitica, Gembloux* 6 (4), 1950 (119–22). 9 refs. [F.] E.M.B.

Notes on an attack of this fungus, hitherto little known on Larch in Belgium. The attack appears to be favoured by unsuitable site conditions.

1908. PŘÍHODA, A. Kořenová hniloba krušnohorských smrků (*Trametes heteromorpha* (Fr.) Bres.). **[Butt rot of Norway Spruce in the Erzgebirge, caused by *T. heteromorpha*.]** *Preslia* 25 (2), 1953 (139–42). 8 refs. [Cz.cz.russ.] E.M.B.

This rot, widespread in the Erzgebirge, begins in the roots and later extends to the heartwood of the stem; the course of the disease is similar to that caused by *Fomes annosus*, but the advanced stage differs in being a cubical rot. The attacked trees are often windthrown over considerable areas. Sporophores develop on the stouter roots and butt of windthrown trees, but a case is known in which small sporophores developed underground on thinner, live roots of a Spruce ca. 20 years old. Other fungi damaging Spruce wood in the region are *Fomes annosus*, *F. marginatus*, *Stereum sanguinolentum* and *Trametes abietina*.

1909. ANDREWS, S. R. **Red rot of Ponderosa Pine in the Southwest.** *Sta. Pap. Rocky Mt. For. Range Exp. Sta.* No. 15, 1954. pp. 11 + 5 photos + 2 gphs. 6 refs.

Describes the development and appearance of red rot caused by *Polyporus anceps*, and discusses its

occurrence with associated fungus damage in immature and merchantable trees, and control measures.

1910. Toole, E. R. **Damage caused by *Polyporus hispidus* on bottomland Red Oaks.** *Abstr.* in *Phytopathology* 44 (9), 1954 (508).

P. hispidus is frequently found in the South associated with cankers and heart rot on the main stems of bottomland Red Oaks. A survey in a single area showed that both Willow and Oak were affected. Most cankers were within 16 ft. of the ground. Heart rot exceeded the length of the cankers by 2·38 ± 0·993 ft. and length of cankers and rot increased by 0·484 ± 0·017 ft./year.

1911. Stillwell, M. A. **Progress of decay in decadent Yellow Birch trees.** *For. Chron.* 30 (3), 1954 (292–8). 4 refs.

About half of the living *Betula lutea* in New Brunswick and Nova Scotia carry dead limbs as a result of dieback. At present ca. ⅓ of these dead limbs contain decay. The fungi so far isolated from these decays appear to be saprophytes, *Fomes fomentarius* being the most common. The possibility of their advancing downwards in the living tree is discussed. *From author's summary.*

Wilts, Diebacks etc.

1912. [***Diplodia pinea* on *Pinus radiata*.**] *Rep. For. Timb. Bur. Aust. 1953*, 1954 (19).

Inoculations of *D. pinea* on young pot plants of *P. radiata* in the greenhouse have shown that this fungus can be established as a wound parasite and spread through the plant tissues during the summer months. There is as yet no evidence that it is a primary pathogen.

1913. Campana, R. J. **The present status of Dutch Elm disease in Illinois.** *Plant Dis. Reptr.* 38 (5), 1954 (356–8). 2 refs. A.P.B.

1914. French, D. W., and Campbell, R. N. **The relation between host moisture content and sporulation of *Endoconidiophora fagacearum*.** *Abstr.* in *Phytopathology* 44 (9), 1954 (488).

Moisture contents of stems of healthy and mat-bearing Pin Oaks were determined in Minnesota in October and November 1953. On typical mat-bearing trees the stem could often be divided into 3 zones: the mat zone, with fresh, young to mature mats; the zone above this, with mats disintegrating; and, below the mat-producing zone, a zone where mats had not yet been produced. The m.c.s (wet weight basis) for these zones were respectively 46·6, 42·8 and 47·6% for the sapwood, and 44·9, 38·9 and 47·8% for the outer heartwood. In 3 healthy trees m.c. of sapwood was 42·3 and that of outer heartwood, 47·7%. The m.c. of sapwood behind new mats was ca. 46·6% in contrast to 42·3% for healthy sapwood.

1915. Fergus, C. L. **Compatibility types isolated from mycelial mats of the Oak wilt fungus.** *Plant Dis. Reptr.* 37 (11), 1953 (565–6). 5 refs. A.P.B.

All isolates made from single mats were of the same compatibility type, and all the mats formed on each of the trees tested were of a single compatibility type.

1916. Barnett, H. L., and Jewell, F. F. **Recovery of isolates of *Endoconidiophora fagacearum* from Oak trees following mixed culture inoculations.** *Plant Dis. Reptr.* 38 (5), 1954 (359–61). 7 refs. A.P.B.

Experiments in inoculating trees with both A and B compatibility types of *E. fagacearum* showed that, following mixed inoculations, certain factors appear to operate, which in most cases lead to the survival of only one type of isolate in a single tree.

1917. Struckmeyer, B. E., and Kuntz, J. E. **Histology of fungus mat development in wilting Oak trees.** *Abstr.* in *Phytopathology* 44 (9), 1954 (507).

Deals with the incidence of vessel plugging by tyloses and gums and, in detail, with the penetration of mycelium through the elements of the xylem and mat formation between wood and bark.

1918. Parmeter, J. R., and Kuntz, J. E. **Oak wilt development in Bur Oaks.** *Abstr.* in *Phytopathology* 44 (9), 1954 (502).

Bur Oaks [*Quercus macrocarpa*] inoculated with *Endoconidiophora fagacearum* showed wilt on scattered branches and lived for several years with progressive stag-heading. Symptomatic tyloses, which plugged the xylem vessels, were limited to a narrow, vertical sector of the bole, and to the vascularly connected branches. Foliage wilt subsequently developed on these branches. The wilt fungus could only be isolated from such trunk sectors or branches. Dyes and radioactive isotopes did not move through the plugged vascular tissue but did move freely through the rest of the tree. During the second season, new wood usually formed over the infected, plugged sector and symptoms appeared sporadically during the summer. Sometimes no foliage symptoms appeared in the second season. Root grafts between adjacent Bur Oaks were rare. Only one root graft between a Bur Oak and a Northern Pin Oak has been detected. In mixed stands, Bur Oaks often escape infection while adjacent Red and Black Oaks die. Fungus mats have not been found on infected Bur Oaks even when they were abundant on neighbouring Northern Pin Oaks.

1919. Hoffmann, P. F., and Zuckerman, B. M. **Oak wilt fungus labelled with C^{14}.** *Science* 120 (3107), 1954 (106–8). 5 refs. O.R.S.

Cultures of the fungus grown on media containing C^{14}-labelled sucrose were proved to have become labelled (*l*). The *l* fungus grew normally when planted on unlabelled (*ul*) agars; no significant differences were found between conidia measurements, germination % and rate and appearance after germination in the *l* fungus and *ul* parent. A *l* and a *ul* strain crossed on *ul* agar produced ascospores containing detectable radioactivity and these produced typical wilt symptoms in *Quercus rubra* seedlings in the greenhouse in 47 days. Injections of *l* conidia into *Q. rubra* and *Q. virginiana* seedlings caused typical wilt symptoms after 20 days. Radioactivity was detected with a monitor at ends of cut stems, at upper and lower leaf surfaces but not

through the bark of stems. Grown on a radioactive medium, the fungus produced a substance causing wilt in tomato and Oak cuttings and with the same Rf value as that from *ul* cultures.

Cankers, Stem Rusts etc.

See also Nos. 1425, 1427–8, 1934.

1920. Lajoš, Z. Rakavost bagremovih stabala. (Kod nas još neopisana bolest bagrema.) **[Canker of Robinia stems. (A Robinia disease not recorded so far in Jugoslavia.)]** *Šum. List* 78 (5/6), 1954 (232–5). 3 refs. [Croat.]

Describes a canker disease observed on a large number of *R. pseudoacacia* stems in the neighbourhood of Sombor (Croatia). The cankers, one or more per stem, are long, narrow and superficial, with overgrown edges and disclose sapwood rot. This is brownish and has a prismatic structure. The affected stems have thin crowns, some of which show dieback. Canker incidence attains 67% in some places. The pathogen has so far not been identified.

1921. Jones, D. R. **Studies on a canker disease of Cypresses in East Africa, caused by *Monochaetia unicornis* (Cook & Ellis) Sacc. II. Variation in the morphology and physiology of the pathogen.** *Trans. Brit. mycol. Soc.* 37 (3), 1954 (286–305 + 2 plates). 14 refs. O.B.D.

It is suggested, on the basis of this study, that the distribution of strains B and D is limited by climate, B being able to compete with A only on dry sites. Strains A and B are considered to be biotypes of one species, whereas D is a separate species or variety. [Cf. *For. Abstr.* 15 (No. 418); 16 (No. 652).] *From author's summary.*

1922. Townrow, J. A. **The biology of *Cryptostroma corticale* and the sooty bark disease of Sycamore.** *Rep. For. Res. For. Comm., Lond. 1952/53*, 1954 (118–20).

[Cf. *For. Abstr.* 14 (Nos. 3489–90); 15 (Nos. 419–20).] The spores are very sensitive to changes in temperature and relative humidity, and can only infect fresh wounds. The fungus has been isolated from roots, but it seems likely that it spreads down from aerial portions of the tree to the roots.

1923. Pont, W., and Bowen, G. D. ***Cytospora* sp. on Sugar Gum.** *Aust. Plant Dis. Recdr.* 6 (1), 1954 (15). I.M.I.

Cankers observed in 1950 and 1952 on twigs and branches of *Eucalyptus cladocalyx* were attributed to a species of *Cytospora*. The disease appears to be correlated with unsuitable site and climatic conditions.

1924. Graham, S. A., and Harrison, R. P. **Insect attacks and *Hypoxylon* infections in Aspen.** *J. For.* 52 (10), 1954 (741–3).

In ca. 95% of 138 *Hypoxylon pruinatum* cankers on the main stems of *Populus tremuloides* and *P. grandidentata* the original seat of infection was insect damage (*Saperda calcarata* 30%, *Dicerca tenebrica* 15, *Agrilus* 15, Lepidoptera 14). Silvicultural control is suggested.

1925. Waterman, A. M. ***Septoria* canker of Poplars in the United States.** *Circ. U.S. Dep. Agric.* No. 947, [1954]. pp. 24. 24 refs.

Canker caused by *Septoria musiva* is an important and destructive disease of hybrid Poplars with Black, Balsam, and Cottonwood parentage, in the U.S.A. It has also been reported in Canada and Argentina. The fungus causes leaf spots on native Poplars, but these species are resistant to stem infections in their natural range. Clones of introduced species are often highly susceptible. Method of infection and progress of the disease are described in detail. Experiments were made in the inoculation of young shoots of hybrid Poplar clones. Analysis of the results showed that, of 202 clones tested, 33 showed no infection, 27 were very slightly susceptible, and 38 were highly susceptible. Similar results were obtained by using the superficial length of lesions or cankers as the basis for estimating susceptibility. Variations in susceptibility to natural infection were observed in 51 of the tested clones. Among 65 clones of *Populus generosa* × *P. jackii* tested by inoculations, one was not infected, and 61 showed slight to high susceptibility. Clones of *P. trichocarpa hastata*, native in the north-western United States, were susceptible to natural infection in Minnesota and to artificial inoculation in Massachusetts. The use only of tested, resistant clones is recommended, and these should be planted in randomized plots or mixed groups, particularly when grown under climatic or soil conditions unlike those in which their resistance was tested. Other precautionary measures are the surface sterilization of dormant cuttings, spraying of stool beds with a fungicide to prevent leaf infection, and a spacing of trees that will provide adequate aeration near the ground, thus preventing high humidity that would be favourable to infection. *From author's summary.*

1926. **Vegetation, location affect Pine blister rust.** *Rep. Wis. agric. Exp. Sta. 1952/53* Part 1, 1954 (40–1). (*Bull. Wis. agric. Exp. Sta.* No. 510).

Research has been carried out on the effect of air humidity and temperature on the spread of *Cronartium ribicola* [cf. *For. Abstr.* 15 (No. 1534)]. Propagation of material from rust-resistant trees has been studied. Grafting in the tops of trees 5–10 ft. high has given 46–63% success. Cuttings root well when taken from young trees, but by the time a tree is old enough to have given evidence of rust-resistance it is too old to provide good rooting cuttings.

1927. Kimmey, J. W. **Determining the age of blister rust infection on Sugar Pine.** *For. Res. Note Calif. For. Range Exp. Sta.* No. 91, 1954. pp. 3. 1 ref.

A study on 6 plots of Sugar Pine in California and Oregon showed that the pattern of canker distribution was similar to that found by Lachmund [*J. agric. Res.* 46, 1933 (675–93)] on Western White Pine and that this method of determining the age of infection is applicable.

1928. Ljubarskiĭ, L. V. Lesohozjaĭstvennoe značenie naplyvov na vetvjah sosny obyknovennoĭ. **[Resinous cankers on the branches of *Pinus***

***sylvestris* as a minor forest product.**] *Lesn. Hoz.* 5 (2), 1952 (78–9). [Russ.]

In the forests of the Soviet Far East, natural stands of *P. sylvestris* are limited to the Amur Province, west of the R. Zeya. Here the stems and branches often bear resinous cankers caused by *Cronartium quercus* (*Peridermium cerebrum*), the alternate host of which is *Quercus mongolica*. The Pine canker decreases as the western boundary of the natural range of the Oak is approached, and disappears near that limit. Other biotic or climatic factors must, however, also be involved, since in other regions where Oak carrying *C. quercus* grows with Pine, the latter is not infected. No such cankers have been observed on *P. funebris* growing with Oak in the Southern Maritime Province. Cankering of *P. sylvestris* increases with decrease of site quality, a fact which is probably explained by the scarcity or absence of *Q. mongolica* in the underwood on higher-quality sites. A small number of cankers does not materially affect the growth of the Pine, but when they are numerous the tree becomes more liable to attack by other agencies injurious to bark and wood, and the combined attacks are fatal. Trees were found bearing up to 150 cankers. Old cankers reach diameters of 30–70 cm., their weight ultimately breaking the branches. On the ground, they dry out without decaying and are collected for resin extraction. In the Amur Province ca. 80% of the resin produced is derived from this source.

Foliage Diseases

See also No. 1445.

1929. MÜLLER, E. Eine Knospenkrankheit der Stechfichte. [**A bud disease of *Picea pungens***.] *Schweiz. Beitr. Dendrol.* No. 2, 1950 (69–72). 3 refs. [G.]

The pathogen is identified as *Cucurbitaria piceae*.

1930. LIGHTLE, P. C. **The pathology of *Elytroderma deformans* on Ponderosa Pine.** *Phytopathology* 44 (10), 1954 (557–69). 16 refs.

Witches' brooms and needle cast of Pine (particularly *Pinus ponderosa* and *P. jeffreyi*) caused by *E. deformans* have become increasingly widespread in the U.S.A. during the past 5 years. Studies of the fungus have shown that: (1) mild temperature and high humidity are important factors in ascospore discharge; (2) culture media ordinarily used for growing fungi were inadequate for growing *E. deformans*; and (3) several organic and inorganic materials known to promote germination of spores of other fungi did not induce germination of its ascospores. The fungus apparently lives entirely within the needle, where the hyphae are confined to the cells of the mesophyll and the lacunae of the resin canals. Phloem cells are caused to degenerate by an unknown substance produced only when the fungus is present. This degeneration extends from the affected needles through the short shoots, and for an undetermined distance proximally in the twig. Groups of degenerating phloem cells provide in many cases the stimulus for pathological resin cyst formation. These are located in the bark in the peripheral zone of phloem, and, after the second year, may be clearly seen with the unaided eye. *From author's summary.*

1931. MORIONDO, F. Osservazioni sul ciclo biologico della *Melampsora* sp. del pioppo in Italia. [**Observations on the biological cycle of a *Melampsora* sp. on Poplar in Italy.**] *Ital. for. mont.* 9 (5), 1954 (259–64 + 1 plate). 16 refs. [It.it.f.]

Describes the occurrence in April of *Melampsora pinitorqua* rust on young twigs of *Populus canescens* growing in mixture with Pine at Grosseto. Dissection revealed the presence of mycelium in the cambium of the infected twigs. Poplar infection usually occurs in the autumn. It appears from these circumstances that this heteroecious rust is not obliged, in order to perpetuate itself, to go through a complete cycle on both hosts annually, but is able to survive, as an absolute parasite, on Poplar alone, this possibility probably depending on particular conditions in the milieu. The possible danger to new Pine plantations in the neighbourhood of *Populus alba*, *P. tremula* and *P. canescens* is emphasized. The investigation is reported in detail.

1932. ITO, K., and CHIBA, O. [**Studies on some anthracnoses of woody plants. 1. Overwintering of *Gloeosporium kawakamii* Miyabe, the cause of anthracnose of *Paulownia tomentosa* Steud.**] *Bull. For. Exp. Sta., Meguro, Tokyo* No. 70, 1954 (93–101). 11 refs. [Jap.jap.e.]

1933. GALLUCCI-RANGONE, M. M. Su tre specie di *Pestalotia* nuove per l'Italia. [**Three species of *Pestalotia* new to Italy.**] *Ann. Sper. agr.* (*n.s.*) 8 (5), 1954 (1437–57 + 2 plates). 13 refs. [It.it.e.] C.G.B.

Includes notes on *Pestalotia gracilis* on *Laurus nobilis*.

1934. BUDDENHAGEN, I. W., and YOUNG, R. A. **A leaf and twig blight of English Holly caused by a species of *Phytophthora*.** *Abstr.* in *Phytopathology* 44 (9), 1954 (483).

The disease, caused by an unidentified species of *Phytophthora*, is characterized by leafspots, and subsequent defoliation and dieback of twigs, cankers, and infection of berry clusters. Stem cankers and defoliation previously attributed to *Boydia insculpta* and *Phomopsis crustosa* are now thought to be caused by this *Phytophthora*.

444. Virus Diseases

See also No. 1885.

1935. NARASIMHAN, M. J. **Studies on the spike disease of Sandal *Santalum album* Linn.** *Indian For.* 80 (11), 1954 (690–1).

Briefly summarizes experiments which indicate that spike disease of Sandal is a virus disease, transmissible by grafting but not by sap inoculation or insect vectors. Cytological investigations confirmed this, showing several characteristics, such as cell-inclusion, that are also found in tobacco mosaic and other virus diseases.

1936. MOORE, J. D., and VARNEY, E. H. **Transmission of a virus from mosaic infected American Elm to Peach.** *Abstr.* in *Phytopathology* 44 (9), 1954 (498–9).

Elm mosaic virus was transmitted to Peach in greenhouse inoculation experiments.

45. DAMAGE BY ANIMALS

451. *Mammals*

See also Nos. 1392–4.

1937. BUCKLAND, D. C. **Squirrels have to be managed.** *B.C. Lumberm.* 38 (9), 1954 (52 . . . 56). 23 refs.

A review of the literature on the grey and red squirrel.

1938. STAEBLER, G. R., LAUTERBACH, P., and MOORE, A. W. **Effect of animal damage on a young coniferous plantation in Southwest Washington.** *J. For.* 52 (10), 1954 (730–3).

Notes on survival and growth in the first 4 years of Douglas Fir, Port Orford Cedar and Western Hemlock.

1939. CHURCH, T. W., JR. **Mice cause severe damage to Virginia Pine reproduction.** *For. Res. Note Ntheast. For. Exp. Sta.* No. 35, 1954. pp. 2. 1 ref.

In a young stand (height 1–10 ft.) of *Pinus virginiana* in Maryland, girdling by *Microtus pennsylvanicus* was confined to natural regeneration on an abandoned field. Tabulated results of a study on three $\frac{1}{100}$-acre plots, including all trees > 0·5 in. diam. at 1 ft. above ground level and some smaller trees, confirm those obtained from an earlier unpublished study. Both demonstrate that *P. virginiana* is attacked in preference to *P. rigida* and that hardwoods are untouched. Damage to *P. rigida* was confined to trees of 0·5–0·8 in. diam., but that to *P. virginiana* was not affected by size, occurring on trees up to 2·2 in. diam. The author concludes that girdling and consequent mortality may be serious in poorly stocked stands but may serve as a rather erratic thinning in dense ones.

1940. **Vole plagues.** *Rep. Nat. Conservancy, Lond. 1953/54*, 1954 (11).

An investigation has been made of the vole plague in the Forestry Commission's plantations in the Carron Valley, Stirlingshire. Damage to plantations was first noticed in November 1952, and by the following summer severe damage to trees by ring-barking, tunnelling and destruction of roots, occurred over 1500 acres, involving the loss of several million trees up to 15 years old. Eighty per cent of the Beech trees in one plantation were killed, while neighbouring Sycamore Maple and Ash were untouched. In the most heavily infested areas the grass had been destroyed to such an extent that a radical alteration of the ground flora was taking place, with the appearance of thistle, dock, foxglove, willow-herb and other species that had not been prominent before. The plague gradually died down during the summer of 1954. Probably nearly 40 pairs of short-eared owls tried to breed in this forest, but few were successful in rearing young.

1941. TROUSDELL, K. B. **Peak population of seed-eating rodents and shrews occurs 1 year after Loblolly stands are cut.** *Res. Note Stheast. For. Exp. Sta.* No. 68, 1954. pp. 2. 1 ref.

In a trapping study over 5 years, rodent populations (very low before felling) reached a peak in the first to second year after felling and then decreased rapidly. Rodents could not, therefore, be responsible in the study area for the progressively poorer regeneration obtained in the 4 years after felling.

1942. **Symposium on rodent control research in the direct seeding of forest and range lands.** *J. For.* 52 (11), 1954 (824–31).

Five papers:—'Rodents and direct seeding' (*D. A. Spencer*) [cf. *For. Abstr.* 15 (Nos. 431, 1547): grain baiting may decimate a mouse population but reinvasion may re-establish the status quo in 1 summer or 3 winter months; by contrast, a resident rodent population can be taught to leave well alone by the cheaper direct treatment of seed with sub-lethal doses. 'Development of better seed protectants' (*N. B. Kverno*) describes laboratory and field work done and the desiderata in selecting repellents; these should reduce the seed consumed on first contact by at least 80%, should protect the seed with little loss of viability for 6–12 months, should not prevent O_2 and H_2O exchange and should be cheap and safe for man, stock and wild life; over 4500 compounds have been tested for repellence and phytotoxicity. 'Direct seeding in the Pacific Northwest' (*E. W. Shaw*); gives results of field-scale tests of tetramine seed treatments and the cost of helicopter sowings. 'The use of tetramine in Bitterbrush vegetation' (*R. L. Casebeer*); compares the results of sowing untreated seed, use of poison bait, and tetramine treatment, to the great advantage of the last. 'Ponderosa Pine seeding in the Black Hills' (*W. H. Harmon*); similar comparisons show the superiority of the direct treatment of seed with tetramine, and the superiority of dextrin to the usual acetone as a solvent. [Cf. *For. Abstr.* 15 (Nos. 1546–8).]

1943. FREAR, D. E. H., and WHITE, D. G. **A promising new deer repellent.** *State Horticultural Association of Pennsylvania News, State College, Pa.* 32 (1), 1953 (73). E.M.B.

A satisfactory repellent for severely browsed Apple trees was made by mixing 2 quarts emulsified bone tar oil with 100 gal. water, and applying this as a spray at monthly intervals throughout the growing season.

452. *Birds*

See No. 1698.

453. *Insects*

See also Nos. 1491, 1796, 1924.

1944. FISHER, R. C. **Some problems in forest entomology.** *Emp. For. Rev.* 33 (4), 1954 (323–8).

The significance of damage by insects to forest crops and products is becoming increasingly recognized by foresters and timber users throughout the world. In a short account of some of the major problems arising out of infestation of timber by insects, stress is laid on the need for accurate biological knowledge of the insects in the development of sound and lasting methods of prevention and control. In this connexion the work of the recently formed West African Timber Borer Research Unit on ambrosia (pinhole borer) beetles

and investigations past and present, at Princes Risborough and elsewhere on powderpost beetles, the house longhorn beetle and furniture beetles, are included as examples. Attention is drawn to the importance of close co-operation between the wood-preserving expert and the biologist, and an appeal is made to teaching entomologists to bring before forestry students in training the practical aspects of forest entomology, emphasizing the contribution it can make towards sound forestry practice and efficient utilization of timber. *Author's summary.*

1945. IVES, W. G. H. **Sequential sampling of insect populations.** *For. Chron.* 30 (3), 1954 (287–91). 3 refs.

[Cf. *For. Abstr.* 14 (No. 484); 15 (No. 3800).] The chief advantage of a sequential sampling technique for estimating the density of insect populations is that a smaller sample size is usually required for a given degree of accuracy, than with the conventional sampling method. Insect populations are usually very variable, and consequently a large sample is required to give reasonably accurate estimates with conventional sampling methods. By using sequential sampling, the sample size can frequently be reduced by an appreciable amount without sacrificing accuracy. A disadvantage of sequential sampling is that point estimates of insect populations cannot be obtained, since population levels are usually expressed in broad categories, i.e. light, medium, or heavy. The number of categories that are practical in sequential sampling is limited to three or four; conventional sampling is required for point estimates.

1946. NEVES, C. M. BAETA. A entomofauna das 'exóticas' em Portugal. **[The insect fauna of exotics in Portugal.]** *Portug. Acta biol.* 4*B* (3/4), 1954 (191–6). [Port.] O.B.D.

A list of species and associated insects.

1947. **East Africa High Commission. Forest entomology.** *Report, 6th Commonwealth Entomological Conference, London* 1954 (227). 1 ref.

A short review of work since 1950.

1948. PREBBLE, M. L. **Canada. Review of forest entomology, 1948–1953.** *Report, 6th Commonwealth Entomological Conference, London* 1954 (206–24). 151 refs.

1949. RAWLINGS, G. B. **Insect epidemics on forest trees in New Zealand.** *N.Z. J. For.* 6 (5), 1953 [1954] (405–13).

A brief account is given of the causes of insect epidemics and the course which they may be expected to follow. Insects causing epidemics are classified as primary or secondary and indigenous or exotic, and trees are classed as either indigenous or exotic. Examples are given of outbreaks in New Zealand and the significance of the absence of outbreaks in certain groups in the classification adopted, is discussed. *Author's summary.*

1950. DVORECKAJA, E. I. Vlijanie èntomovrediteleĭ na zasuhoustoĭčivostj drevesnyh i kustarnikovyh porod. **[The effect of insect pests on the drought resistance of tree species and shrubs.]** *Lesn. Hoz.* 5 (1), 1952 (67–71). [Russ.]

Young (22- to 25-year) trees of 'Common' Elm [*Ulmus foliacea*?] in shelterbelts of the Kamyshin experiment station of VNIALMI showed poor drought resistance, manifested in defoliation or dieback, especially during the extreme drought of 1949. These trees had been weakened by the attacks of *Zeuzera pyrina* and *Scolytus multistriatus*, and their lowered drought resistance is ascribed to disturbance of water conduction by the insect galleries, possibly aggravated by toxic substances produced by the insects. In 1949 many of the affected trees showed an orange-red sugary flux from the stems, often traceable to an insect gallery. *U. pinnato-ramosa* in the same locality was more resistant to insect pests, and only one case of attack by *Z. pyrina* was observed.

Chemical analyses of leaves for carbohydrates are tabulated for 'Common' Elm, *U. pinnato-ramosa*, *Quercus robur*, *Populus* sp., 'Green' Ash [*Fraxinus pennsylvannica*?] and *Acer platanoides*, covering monosaccharides, sucrose, saccharides not readily hydrolysed, and starch, and a correlation is stated to exist between leaf composition and degree of attack by defoliating insects. 'Common' Elm leaves, rich in carbohydrates (11·8–12·4% water-soluble saccharides, 19·6–21·2% total 'mobile' carbohydrates), are heavily defoliated by *Lycia histaria*. *A. platanoides* is very resistant to this insect since water-soluble saccharides are low (3·8–4·9%), and though starch is high, the insect produces little or no amylase. Leaves of *Q. robur* showed high monosaccharide content (6·7%) but no sucrose; they are greatly preferred by *Lymantria dispar* and it is possible that the latter lacks invertase, which would enable it to utilize the high sucrose content of Elm leaves. Factors such as these should receive attention in tree breeding work.

1951. PADIĬ, N. N. Vrediteli semjan listvennicy v USSR. **[Larch seed pests in the Ukrainian SSR.]** *Lesn. Hoz.* 5 (1), 1952 (71–3). [Russ.]

In stands of Siberian and European Larch in the Ukraine > 75% of the cones were found in 1950 to be damaged by *Dioryctria abietella*, *Megastigmus seitneri* and *Chortophila laricicola* (the latter until recently limited to the Lake Baikal region), the two last being the most injurious. Treating the litter with 12% BHC dust (50 kg./ha.) at the time when the larva of *C. laricicola* leaves the cones, gave an average kill of 44·1%. Dusting of the crowns with 10% DDT (25 kg./ha.) was not very successful, owing to rainy weather, but reduced the number of cones infested by *C. laricicola* and *M. seitneri*.

1952. ANGUS, T. A. **Some properties of a bacterial toxin affecting insect larvae.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (4), 1954 (2–3).

A material extracted from *Bacillus sotto* has proved toxic to the larvae of a number of lepidopterous insects. The most susceptible insects are those with the most alkaline gut juice and the most resistant those with a gut pH near neutrality.

1953. SLÁDEK, J. K otázke využitia vtáctva v boji proti lesným škodcom. **[Using birds to control forest pests.]** *Les, Bratislava* 1 (9), 1954 (12–7). [Slovak.]

Illustrated descriptions of different types of nesting box used in the U.S.S.R.

1954. WACHTENDORF, W. Über die Einsatzmöglichkeiten innertherapeutischer Präparate im Forstschutz. **[The possibilities of systemic insecticides in forest protection.]** *Anz. Schädlingsk.* 27 (11), 1954 (166–7). 6 refs. [G.]

Presents briefly the results of trials of systemic insecticides against various types of pest in different parts of Bavaria in 1953 and 1954.

1955. LANGFORD, G. S. **Tolerance of trees and shrubs to new organic insecticides.** *Arborist's News, Wooster* 18 (5), 1953 (41–6). L.S.

A lecture giving data for DDT, chlordan, BHC, TDE, aldrin, dieldrin, toxaphene, HETP, TEPP, parathion, metacide, EPN, malathion and Dilan.

1956. CROOKE, M. **Forest entomology.** *Rep. For. Res. For. Comm., Lond. 1952/53*, 1954 (70–4).

Two projects relating to the field use of insecticides were carried out. The first tested the usefulness of BHC, dieldrin, DNOC (dinitro-*o*-cresol), lindane, and lindane/toxaphene when applied to normal billet and spray traps for the control of Pine weevils [*Hylobius abietis*]. Initial results were slightly encouraging, but it is considered that the technique of insecticidal trapping is of doubtful practicability, and experiments are to be made to determine the feasibility of protecting young plantations from Pine weevil by application of insecticidal dusts to the plants themselves. In the second experiment, two systemic insecticides, Pestox 3H and Hanane, were applied to young Douglas Fir in an effort to control *Adelges cooleyi*. When applied directly to the foliage, good control was achieved with both insecticides for a period of 6 weeks; but application by watering on to the roots was ineffective.

1957. WOLCOTT, G. N. **Residual effectiveness of insecticides against soil-inhabiting insects.** *Journal of Agriculture of the University of Puerto Rico* 38 (2), 1954 (108–14). 3 refs. [E.e.span.] P.R.

Presents the results of tests with chlordane, γ BHC, aldrin and DDT, on first-instar or older larvae of *Diaprepes abbreviatus*, *Phyllophaga* (*Lachnosterna*) *portoricensis* and *Ligyrus* sp., when the insecticides were freshly applied to soil and 3 years later.

1958. MARTIN, J. T., and BATT, R. F. **Spray application problems: VII. The determination of DDT in plant material.** *Rep. agric. hort. Res. Sta. Univ. Bristol 1953*, 1954 (121–8). 16 refs.

Describes in detail a rapid method for the detection of DDT in plant material. CCl_4 is used for the initial extraction, wax and pigment are removed with Al_2O_3, the nitrated DDT is separated from the nitration mixture with CCl_4, and the colour is developed with alcoholic KOH. The method determines the *p,p'*-isomer and has been used successfully in the analysis of foliage, fruits and grain.

1959. HOCKING, K. S., PARR, H. C. M., YEO, D., and ANSTEY, D. [G.] **Aircraft applications of insecticides in East Africa. IV. The application of coarse aerosols in savannah woodland containing the tsetse flies *Glossina morsitans* and *G. swynnertoni*.** *Bull. ent. Res.* 44 (4), 1953 (627–40). 6 refs.

[Cf. *For. Abstr.* 15 (No. 2665).] A report on experiments made during the period July to November 1949 in 2 blocks of savanna woodland in the Central Province of Tanganyika. Coarse aerosols were used with a mass median diam. of ca. 90μ; droplet diameters varied from ca. 4 to 250μ. Eight applications were made at intervals of 2 weeks, each at a nominal dosage of 0·25 gal./acre, equivalent to 0·20 lb./acre of the *p,p'*-isomer of DDT, or 0·03 lb./acre of BHC. In the area treated with DDT it is possible that both species were eradicated for a short period, but small populations were re-established by immigrant flies. In the other block the reduction was not so great; this is not attributed to lower effectiveness of the BHC, but to a combination of circumstances that led to less effective applications. Some general observations are made on the use of aircraft for this sort of work, particularly in connection with the effect of meteorological conditions. *From authors' summary.*

1960. HOCKING, K. S., YEO, D., and ANSTEY, D. G. **Aircraft applications of insecticides in East Africa. VI. Applications of a coarse aerosol containing DDT to control the tsetse flies, *Glossina morsitans* Westw., *Glossina swynnertoni* Aust. and *Glossina pallidipes* Aust.** *Bull. ent. Res.* 45 (3), 1954 (585–603). 8 refs.

Reports experiments in applying a coarse aerosol to savanna woodland at Kitore, Central Province, Tanganyika. Seven applications were made, each at a nominal dosage of 0·25 lb. technical DDT (80% *p,p'* isomer)/acre and 0·25 gal. solution/acre. The applications in any particular part of the treated woodland (known as the Galapo Block) covered an interval of 90 days, or rather more than 2 pupal periods, during the period Sept. 1950 to Jan. 1951. The coarse aerosol was produced by emitting the insecticidal solution under pressure through fine nozzles fitted to a boom. It had a mass median diam. of ca. 60μ and droplet diam. varied from a few microns to ca. 200μ. The population of *G. pallidipes* was so drastically reduced that it has subsequently died out. *G. morsitans* was reduced by ca. 98%, and *G. swynnertoni* by ca. 95%. The differing results of various experiments in this field are difficult to explain. Increased cover in savanna areas during the leafy period may have reduced the effectiveness of the applications, and the total periods covered by the various series of applications were probably also important. *From authors' summary.*

1961. HOCKING, K. S., BURNETT, G. F., and SELL, R. C. **Aircraft applications of insecticides in East Africa. VII. An experiment against the tsetse flies, *Glossina morsitans*, Westw. and *G. swynnertoni* Aust., in the rainy season.** *Bull. ent. Res.* 45 (3), 1954 (605–12 + 2 photos). 5 refs.

The experiments were conducted over some 4,000 acres of mixed bush. The insecticide used was equivalent to a 19·4% solution of technical BHC (equal to 2·45% γ isomer) in 50/50 diesel oil and power kerosene. The solution was dispensed through a boom and nozzles under pressure as a

coarse aerosol (mass median diam. 70μ), at a nominal mean dose of 0·25 lb. technical BHC/acre per application. Seven applications were made. The first proving relatively ineffective, the emission rate for the second and subsequent cycles was increased and over part of the block the swathe width was reduced. A much improved kill resulted but neither species of tsetse was exterminated. Owing to the number of factors involved it is not possible to give any principal reason why this experiment was less successful than previous ones, but many of the difficulties encountered are inherent in rainy-season operations in East Africa. *From authors' summary.*

1962. Hocking, K. S., Burnett, G. F., and Sell, R. C. **Aircraft applications of insecticides in East Africa. VIII. An experiment against the tsetse fly, *Glossina swynnertoni* Aust., in an isolated area of thornbush and thicket.** *Bull. ent. Res.* 45 (3), 1954 (613–22 + 2 photos). 7 refs.

An area of 2200 acres in Central Province, Tanganyika, was treated with a DDT-in-oil aerosol. Eight applications of 0·25 lb. technical DDT/acre at fortnightly intervals, were planned, but unseasonal bad weather reduced this to 7 at a slightly higher rate over a slightly longer period. *G. swynnertoni* was reduced from an apparent density of ca. 7 to zero at the end of the second application. No flies were caught for a period of 6 months after the fifth application. The experiment was more successful than that on the Galapo Block in the same area, but this is attributed to the vulnerability of the smaller population present. *From authors' summary.*

Isoptera

1963. Kalshoven, L. G. E. **Survival of *Neotermes* colonies in infested Teak trunks after girdling or felling of the trees. (Second communication.)** *Commun. For. Res. Inst., Bogor* No. 45, 1954. [E.e.] *Repr.* from *Tectona* 43, 1953 [1954], (59–74).

In continuation of previous studies [cf. *For. Abstr.* 14 (No. 1345)] observations and experiments were made on the development of colonies of *Neotermes* inhabiting trunks of Teak trees after girdling and also when felled and left lying on the forest floor. An amplification of previous recommendations for forest management is based on these results. If logs harbouring a *Neotermes* colony are left flat on the forest floor, rapid decline and dying out of the colonies generally starts at once. After the first 3–4 months about 50–60% of the logs are empty, and up to 100% after 7–8 months. A few exceptionally large colonies may survive for as long as 10 months and it may be assumed that they produce large numbers of winged sexuals. The decline and death of the colonies can be accelerated by splitting the logs longitudinally, and the process is shortened where infested timber is exposed at the beginning of the rainy season instead of during the dry season. Keeping the logs under a roof prolongs the life of the colonies. For rapid extermination of the colonies it is of prime importance that the logs should be in close contact with the soil throughout their length. The main factor involved is the activity of predatory soil-dwelling ants and common subterranean termites, the latter competing with the *Neotermes* colonies which have been subjected to unnatural conditions. *From author's summary.*

Thysanoptera

1964. Vité, J. P. Zum gegenwärtigen Stand der Erfahrungen mit *Taeniothrips laricivorus* Krat. **[The present state of knowledge of *T. laricivorus*.]** *Anz. Schädlingsk.* 27 (11), 1954 (161–6). 10 refs. [G.]

A summary of the results of research (mainly German) from 1904 to the present day, presenting data on distribution, taxonomy, life history, damage inflicted and control of this pest.

Hemiptera

See also Nos. 1382, 1426, 1872–3, 1956.

1965. Lutte contre *Phytolyma lata*. **[Control of *P. lata*.]** *Rapp. Inst. nat. Étude agron. Congo belge 1953*, 1954 (105, 321). [F.]

At Yangambi, *Chlorophora excelsa* plants 1·5 m. high and 2 months from planting were treated with 0·025% (*a*) Hanane [cf. *For. Abstr.* 15 (No. 2672)], (*b*) 'Systox' (50% ethyl-mercaptoethyl-diethyl-thiophosphate) and (*c*) 'E605' (46·7% parathion), the first as a watering at 5 litres [per plant?], the others as sprays: (*b*) and (*c*) were 100% effective but (*a*) killed only 0–38 and 47% of the insects in 2–5 and 7 days respectively. Four weeks after treatment all plants showed new galls. At Bambesa ca. 100 nursery plants were sprayed weekly with 0·1% Systox. In spite of the proximity of infested controls, at the end of 2 months no attack was noted compared with 27 plants attacked out of 60 control plants. After 3 months a slight thickening in the terminal shoot of 4 treated plants (compared with 52 in the control) was noted. The controls, later treated in their turn, showed a healthy appearance 5 months after treatment.

1966. Příhoda, A. Poškození jasanů merami. **[Damage to Ash by Psyllidae.]** *Lesn. Práce* 33 (7), 1954 (314–6). [Cz.]

Describes attacks on Ash leaves by *Psyllopsis fraxini* and *P. fraxinicola* in Czechoslovakia.

1967. Delucchi, V. *Aphidecta obliterata* L. (Coleoptera, Coccinellidae) als Räuber von *Dreyfusia* (*Adelges*) *piceae* Ratz. **[*A. obliterata* as a predator of *Adelges piceae*.]** *Pflanzenschutzberichte, Wien* 11 (5/6), 1953 (73–83). 6 refs. [G.g.e.] C.G.B.

Notes on the life history of *A. obliterata* and its parasites. *A. obliterata* has only one generation a year and attacks *Adelges piceae* in late spring. Its value in control of the pest is fairly small, but 3200 adults were sent to Canada in 1951 and 1952 to help to control outbreaks there. Brief notes are presented on rearing and transport.

1968. Hottes, F. C. **Notes on some species of *Cinara*, with descriptions of two new species from Piñon Pine (Aphidae).** *Proceedings of the Biological Society of Washington, Washington* 66, 1953 (153–8). L.S.

The new species found on Piñon Pine were *C. piñona* and *C. wahtolca.*

1969. ENGLISH, L. L., and TINKER, M. E. **The effect of DDT sprays on mite and aphid populations on Elms.** *J. econ. Ent.* 47 (4), 1954 (658–60). 9 refs.

Populations of *Tetranychus bimaculatus* and the aphid *Tuberculatus ulmifolii* were studied for 2 years on sprayed and unsprayed Elms. The DDT was conducive to a steep rise in mite populations, which, in the first observation year when 2 applications were made, reached 5 times that of the unsprayed trees. Aphid populations also were higher on sprayed than on unsprayed trees. [Cf. *For. Abstr.* 16 (No. 1994).] *From authors' summary.*

1970. ENGLISH, L. L., and DECKER, G. C. **Spray mixtures to control Putnam scale and bark beetles on Elms.** *J. econ. Ent.* 47 (4), 1954 (624–7). 11 refs.

Elms were sprayed for control of *Aspidiotus ancylus* and smaller European Elm barkbeetles with a dormant oil and a DDT emulsion. The sprays were applied separately and in mixtures by (1) hydraulic and (2) mist-blower equipment. The oil spray (Dendrol) was manufactured by the Standard Oil Company of Indiana and contained: petroleum oil 90·34%, petroleum sulphonates 7·86%, and inert ingredients 1·8%. The following applications gave promise of control for both pests: (*a*) Dendrol 4% mixed with DDT 2% by (1), (*b*) Dendrol 4% by (1) followed by DDT 12% by (2), (*c*) Dendrol 24% mixed with DDT 12% by (2), (*d*) Dendrol 24% mixed with DDT 6% by (2), (*e*) Dendrol 12% mixed with DDT 6% by (2).

1971. Études diverses. **[Various studies [at the plant pathology laboratory, Bambesa].]** *Rapp. Inst. nat. Étude agron. Congo belge 1953*, 1954 (320–1). [F.]

The coccid *Sfictoccus formicarius* (associated with an ant of the genus *Camponotus*) which frequently attacks young plants of *Sarcocephalus diderrichii* was eliminated for several months by a treatment of 1% parathion (46·6%).

1972. THOMPSON, W. R. **Biological control work on Cedar scales in Bermuda—with discussion.** *Report, 6th Commonwealth Entomological Conference, London* 1954 (89–95).

[Cf. *For. Abstr.* 15 (Nos. 463–4).] A summary of work on the biological control of *Carulaspis visci* and *Lepidosaphes newsteadi* on *Juniperus bermudiana*. The campaign failed in its object, which was the preservation of the Cedar forests, but was probably not entirely unsuccessful in that stands of healthy trees and isolated trees still remain scattered here and there over the island. In a survey made in 1953 it was found that, although the scale population had fallen owing to the death of the majority of the trees, the parasites did not move from the dead trees to the live ones, and consequently also declined in importance. Results obtained with *Aspidiotiphagus citrinus* and *A. lounsburyi* show that there may be only slight morphological differences, but wide differences in behaviour, between the 2 species.

Lepidoptera

See also Nos. 1383–4, 1393, 1759.

1973. BLANKWAARDT, H. F. H., ELTON, E. T. G., MINDERMAN, G., and SLOOTEN, H. J. VAN DER. Ontstaan van wilgenhoutrups-aantastingen. **[The origin of infestations by larvae of *Cossus cossus*.]** *Ned. Boschb.-Tijdschr.* 26 (10), 1954 (249–55). 7 refs. [Du.e.] (*Meded. Inst. toegep. biol. Onderz. Nat.* No. 17.)

Experiments with the larvae in cages attached to the stems of Oak and Birch showed that newly-hatched larvae could enter the stem only where the cambial zone had been exposed fairly recently; older larvae, over 2 cm. long could bore through sound bark. When infested trees were felled and left lying close against 21 sample trees of various species in May, sound trees were attacked by the older larvae. Recommendations for control are painting fresh wounds with tar against attack by newly hatched larvae, and removing and destroying infested parts of felled trees or treating the tunnels with insecticide and blocking the entrances, against the spread of older larvae.

1974. BATZER, H. O., and BENJAMIN, D. M. **Cold temperature tolerance of the European Pine shoot moth in Lower Michigan.** *J. econ. Ent.* 47 (5), 1954 (801–3). 3 refs.

The gradation of survival after exposure for varying periods at −25° C. indicates a threshold lying between −25 and −30°, temperatures below −30 being undoubtedly precarious for unprotected overwintering larvae. *Rhyacionia buoliana* may be expected to remain troublesome until lethal temperatures and shallow snow cover occur together. *From authors' summary.*

1975. ROSE, A. H., and BLAIS, J. R. **A relation between April and May temperatures and Spruce budworm larval emergence.** *Repr.* from *Canad. Ent.* 86 (4), 1954 (174–7).

From 1949 to 1952 data on the progressive development of budworm were collected from plots near the Cedar Lake Field Station, and were studied in connexion with temperature records for the same period. Monthly mean temperatures for April in 1949 and 1952, when emergence was early, show a deviation from the 1914–1950 averages for April and May of +6·6° and +8·5° F. respectively, whereas in 1947 and 1950 when emergence was late, the deviations were −4·2° F. and −7·9°. In all 6 years abundant larval emergence took place after temperatures had risen to or above 60°. Emergence was delayed if preceding temperatures were low and the rise to 60° sudden. Length of time spent in the various instars was also partly dependent upon temperature. Two peaks of emergence were noted in 1949 and 1952. In 1952 this was attributable to unusual weather conditions, high temperatures in April being followed by cooler and more seasonable weather, with a rise to an average maximum for 20–25 May of 74°.

1976. MORRIS, R. F. **A sequential sampling technique for Spruce budworm egg surveys.** *Repr.* from *Canad. J. Zool.* 32 (4), 1954 (301–13). 9 refs. [Laboratory of Forest Biology, Fredericton, New Brunswick.]

1977. MORRIS, R. F., and MILLER, C. A. **The development of life tables for the Spruce budworm.** *Repr.* from *Canad. J. Zool.* 32 (4), 1954 (283–301).

21 refs. [Laboratory of Forest Biology, Fredericton, New Brunswick.]

A method of preparing life tables, with column headings adopted from human life tables plus an additional column for mortality factors, is described and two examples are presented, based on intensive population sampling on permanent plots, complemented by data on fecundity, natural and applied control factors and dispersion.

1978. SMITH, C. C. **Insecticide tests against Spruce budworm.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (5), 1954 (1).

Experiments were made in the use of 4 insecticides as possible substitutes for DDT in ground spraying of small trees. The use of DDT in this way often results in increased damage by Spruce mites. The tests indicate that Malathion is almost as effective as DDT against the budworm and also kills mites. Lead arsenate was only moderately effective, and both aldrin and dieldrin gave poor results.

1979. COPPEL, H. C., and MAW, M. G. **Studies on dipterous parasites of the Spruce budworm, *Choristoneura fumiferana* (Clem.) (Lepidoptera: Tortricidae). IV *Madremyia saundersii* (Will.) (Diptera: Tachinidae).** *Canad. J. Zool.* 32 (4), 1954 (314–23). 16 refs. O.R.S.

Discusses distribution, development in the host, period from egg deposition to adult emergence (17 days in the laboratory), life history and habits, and describes and illustrates the immature stages of the parasite.

1980. BENJAMIN, D. M., and DROOZ, A. T. **Parasites affecting the Jack Pine budworm in Michigan.** *J. econ. Ent.* 47 (4), 1954 (588–91). 9 refs.

[Cf. *For. Abstr.* 15 (No. 476).] A report on investigations into parasites of *Cacoecia pinus* begun during outbreaks in the Huron National Forest and adjacent State forests in the lower peninsula of Michigan in 1951–52–53. Comparisons with parasites collected in Ontario, with parasites of the Spruce budworm from New England, and with parasites of a budworm variety in Colorado indicate that some of the more important parasites are widely distributed on several species and varieties of budworms. Those probably of importance in reducing budworm populations are *Itoplectis conquisitor* and *Apanteles fumiferanae*.

1981. ALLEN, J. D., and BULL, R. A. **Recent severe attacks on Oil Palms by two new caterpillar pests belonging to the Limacodidae.** *J. W. Afr. Inst. Oil Palm Res.* No. 2, 1954 (130–7 + 4 plates). E.M.B.

The species in one case was identified as *Parasa* sp. nr. *serratilinea*, and the other probably belongs to the same genus.

1982. PRENTICE, R. M. **Decline of populations of the forest tent caterpillar in Central Saskatchewan.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (5), 1954 (2).

The decline is due to failure of egg bands to hatch in the spring of 1954. Egg bands collected in Sept. 1953 and incubated in the laboratory, hatched normally. Dissections of field collections showed heavy mortality of embryos, the cause of which is unknown.

1983. BÖHM, H., and PSCHORN-WALCHER, H. Biologie und Bekämpfung von *Hyphantria cunea* Drury (Lepidopt., Arctiidae—Weisser Bärenspinner). [**Biology and control of *H. cunea*.**] *Pflanzenschutzberichte, Wien* 9 (7/10), 1952 (105–50). 12 refs. [G.g.e.] C.G.B.

The results of an intensive study made in Austria, presenting findings on the biology, ecology, natural enemies and control of the pest. It is essential to begin chemical control measures as soon as possible after the appearance of the first generation. The best time for spraying is when the majority of the larvae are in the second instar.

1984. REICHART, G., SZALAY, and MARZSÓ, L. Védekezési kísérletek az amerikai fehér szövölepke (*Hyphantria cunea* Drury) ellen. [**Control experiments on *H. cunea*.**] *A növényvédelem időszerü kérdései, Budapest* No. 1, 1954 (20–7). [Hu.?] From *abstr.* in *Hung. agric. Rev.* 3 (2), 1954 (11). [E.] C.G.B.

A DDT/BHC oil emulsion seems to give best results in the control of *H. cunea*. Insecticidal dusts wetted with water are less efficient, and dry dust still less so.

1985. GYÖRFI, J. ***Hyphantria cunea* Drury.** *Erdészeti Tudományos Intézet Évkönyve, Budapest* 2, 1952 (1954), (183–98). [Hu.?] From *abstr.* in *Hung. agric. Rev.* 3 (2), 1954 (11). [E.] C.G.B.

The pest, introduced to Hungary about 1940, is now found on 60 host plants, but chiefly on *Morus* [*alba*?], *Acer* spp., and *Pyrus malus*. The first generation in forests usually settles on *Sambucus nigra* and migrates later to other species. Natural enemies and methods of control used in Hungary are described and discussed.

1986. VIVANI, W. [**Control of *Stilpnotia* [*Leucoma*] *salicis*.**] *Coltivatore* [*Monferrato*] (*n.s.*) 99, 1953 (402–4). [It.] From *abstr.* in *Chem. Zbl.* 125 (17), 1954 (3784). [G.] L.S.

Spraying with 0·4–0·8% Pb arsenate solutions with or without added BHC gave good results.

1987. DOUCETTE, C. F. **Recurrence of the satin moth in the Pacific Northwest.** *J. econ. Ent.* 47 (5), 1954 (939–40). 3 refs.

Stilpnotia [*Leucoma*] *salicis*, first reported in 1920 in British Columbia, gradually spread southward into Western Oregon. Up to 1935 there was serious defoliation of Willows and Poplar. From 1929 to 1934 various parasites including *Apanteles solitarius* were released. A general decrease of the moth coincided with conspicuous abundance of this parasite in Western Washington. The moth appeared again in appreciable numbers in 1953 near Tacoma, Wash.

1988. KUDLER, J. Mniška a boj proti ní. [**The nun moth and its control.**] *Lesn. Knihovna* (*malá Řada*) No. 40, 1954. pp. 50 + [1]. 42 refs. [Cz.] Price *Kčs*.4·15.

A booklet including sections on: description of pest; evaluation of the degree of infestation during periods of relative quiescence and mass outbreaks;

methods of control; and instructions issued by the Czechoslovak Ministry of Forests and Timber Industry. The literature quoted is Czechoslovakian, Russian and German.

1989. Grison, P., and Biliotti, E. Gusjenice četnjaka i uslovi kemijske borbe protiv njih. [**Larvae of *Thaumetopoea processionea* and *T. pityocampa* and conditions for their chemical control.**] *Šum. List* 78 (5/6), 1954 (209–32). 43 refs. [Croat. croat.f.]

Describes tests with different methods of chemical control (dusting from aircraft, fogging from the ground, insecticidal smokes, etc.) conducted in 1949–52 in France for controlling the attack of both pests. The effectiveness of the methods employed was ascertained by using 'test insects' placed in the same conditions as the pests. It was found that DDT (powder) was more effective against Lepidoptera than the same weight of BHC. The killing power of 1% BHC for *Melasoma populi* was found to be 4 times as great for the 1st- as for the 4th-instar larvae. No consistent figures were obtained for aircraft dusting. The DDT fogging experiments showed rapid 80% kill of 3rd to 4th instars of *Thaumetopoea* at a height of 4–6 m., and a 20% kill at tree-top level (20- to 25-m. Pine). The best results were obtained from fumigating with DDT dissolved in an aerotropic solvent-mixture; an almost total kill of the 2nd-instar larvae at height of 3 m. was observed at distances of up to 120m. from the fumigating apparatus. The toxicity of the insecticides to other insects is recorded.

Coleoptera

See also Nos. 1385–8, 1748, 1770, 1804, 1956, 1970, 2367.

1990. Charvát, K., and Čapek, M. Škody spôsobené chrobákmi na topoľoch Žitného ostrova. [**Damage by larvae to Poplars on Žitny island.**] *Les, Bratislava* 1 (9), 1954 (20–8). 9 refs. [Slovak.]

Poplar leaf pests include chrysomelids (*Melasoma populi, Phyllodecta vitellinae, Chalcoides aurea, Clytra laeviuscula, Labidostomis tridentata*), curculionids (*Byctiscus populi, Polydrosus sericeus, Phyllobius oblongus*), cerambycids (*Saperda carcharias, S. populnea*), and scarabaeids (*Melolontha melolontha, M. hippocastani*). The damage done by *S. carcharias* to stems and branches in pure plantations (13–26 years) of *Populus deltoides* var. *monilifera* (with some accessory species; density 0·9–1·0) was found in the Gabčikovo forest district (near Bratislava) to amount to 67–84% for stands in non-flooded areas as against 34–47% in floodlands. The extent and nature of technical damage done by *S. carcharias* to Poplar wood is described, and control methods are recommended.

1991. Fassatiova, O. Nový entomofagní druh rodu *Sporotrichum* Link. [**A new entomophagous species of *Sporotrichum*.**] *Preslia, Praha* 25 (3), 1953 (273–80). 14 refs. [Cz.cz.russ.e.] L.S.

S. cejpii sp. nov. has been isolated from dead imagos of *Cetonia aurata* and *Clytra quadripunctata*. The fungus mummifies the insects, covering them with a creamy-white floccose growth.

1992. Smith, R. H. **A leaf-chewing beetle [*Systena marginalis*] causes Cypress foliage to discolor in mid-summer [in the south-eastern U.S.A.]** *Res. Note Stheast. For. Exp. Sta.* No. 70, 1954. pp. 2.

1993. Kriebel, H. B. **Bark thickness as a factor in resistance to White Pine weevil injury.** *J. For.* 52 (11), 1954 (842–5). 4 refs.

Counts of the crooks [on the standing bole] of dominants and co-dominants in 5 pure even-aged stands of *Pinus strobus* showed positive correlation between weevil attack, thus evaluated, and bark thickness at b.h. Less correlation was found with d.b.h. and there was considerable variation due to unknown factors. Bark thickness at b.h. is a cumulative expression of annual phloem production, and phloem thickness in the terminal shoot is important to weevil attraction, oviposition and larval development. Among even-aged trees of equal diam. and height, those with the thinnest bark are likely to be least damaged, and this may be used as a guide in selecting trees to be tested for inherited resistance to weevil injury.

1994. Mathysse, J. G., Miller, H. C., and Thompson, H. E. **Insecticide deposits for control of Elm bark beetles.** *J. econ. Ent.* 47 (5), 1954 (739–46). 8 refs.

Discusses the results of single, annual, prefoliar treatments of *Ulmus americana* trees, chemical analyses of bark, and bio-assays of residual effects by offering twigs to *Scolytus multistriatus* and *Hylurgopinus rufipes*. Heavy applications of DDT emulsions (not suspensions) gave deposits active over long periods except in tall trees where protection was incomplete after 3 months, but disease (*Ceratostomella ulmi*) incidence even in these trees indicated a low probability of inoculation by *H. rufipes*, as a result of reduced feeding by this beetle. Similar but less conclusive evidence was found for *S. multistriatus*. The prefoliar applications were also effective against *Galerucella xanthomelaena*. Repeated annual treatments caused injury to the trees and increased mite and aphid populations [cf. *For. Abstr.* 16 (No. 1969)]. Solutions were more injurious than emulsions. Laboratory trials indicated that dieldrin, parathion, and lindane are equal or superior to DDT against barkbeetles dieldrin being the most effective and probably the most practical.

1995. Downing, G. L. **Ethylene dibromide sprays for controlling barkbeetles in California.** *Misc. Pap. Calif. For. Range Exp. Sta.* No. 17, 1954. pp. 2.

Equipment, procedure, rates of application and sources of supply in the U.S.A. [Cf. *For. Abstr.* 15 (No. 3826).]

1996. Massey, C. L., and Wygant, N. D. **Biology and control of the Engelmann Spruce beetle in Colorado.** *Circ. U.S. Dep. Agric.* No. 944, 1954. pp. 35. 4 refs.

1997. Fitze, K. Prezimljavanje malog jelovog potkornjaka (*Cryphalus piceae* Ratzb.). [**Hibernation of *C. piceae*.**] [*Publ.*] *Inst. nauč. šum. Istraž., Sarajevo* No. 2, 1953. pp. 18. 4 refs. [Croat.e.g.]

Observations in Bosnia in winter 1951–52 have confirmed the findings of Braun. [See *For. Abstr.* 4 (p. 129).]

1998. Quaschik, E. Der Fichtenborkenkäfer. [*Ips typographus.*] Akademische Verlagsgesellschaft Geest & Portig K.-G., Leipzig. 1953. pp. 36. 10 refs. [G.] (*Die Neue Brehm-Bücherei* No. 97.) Price *DM* 1·50.

A semi-popular compilation covering the damage done, morphological characters of the beetle and its most important associates, life history, natural enemies, and control.

1999. Györfi, J. Az *Ips typographus* magyarországi károsítása 1946–1952-ben. **[Damage done by *I. typographus* in Hungary in 1946–52.]** *Erdészeti Tudományos Intézet Évkönyve, Budapest* 2, 1952 (1954), (169–82). [Hu.?] From *abstr.* in *Hung. agric. Rev.* 3 (2), 1954 (11). [E.] C.G.B.

Mass outbreaks in 1946–48 and 1951–52 were mainly due to very dry and warm weather. Highly resinous Spruce stems were found to be immune for several years even if surrounded by infested trees. In Hungary the insect has two generations per year, but with favourable weather larvae or pupae of a third generation may hibernate. The author recommends felling three times as many trap trees as the number of trees attacked.

2000. Struble, G. R., and Hall, R. C. **Telephone cables invaded by shrub bark beetle in Pacific Coast Region.** *J. econ. Ent.* 47 (5), 1954 (933–4). 1 ref.

Micracis hirtellus, now a pest of some importance in Californian communications, bores through the polyethylene cable-covering and remedy is being sought in coating the outer layers of this sheath with long-lasting insecticides. Natural hosts are *Rhamnus*, *Arbutus*, *Umbellularia* and *Alnus*.

2001. Smith, R. H., and Mergen, F. ***Pityophthorus pulicarius* (Zimm.), a bark beetle attacking scions of grafted Slash Pines.** *Res. Note Stheast. For. Exp. Sta.* No. 64, 1954. pp. 2.

Extensive damage was caused to grafted material at the Lake City, Florida, Research Station.

2002. Fischer, M. Untersuchungen über den kleinen Holzbohrer (*Xyleborinus saxeseni* Ratz). **[Investigations on *X. saxeseni.*]** *Pflanzenschutzberichte, Wien* 12 (9/12), 1954 (137–80). 21 refs. [G.g.e.] E.M.B.

A study of the morphology, life history, habits, geographical distribution and control of the beetle.

2003. Burrage, R. H., and Gyrisco, G. C. **Estimates of population and sampling variance of European chafer larvae from samples taken during the first, second and third instar.** *J. econ. Ent.* 47 (5), 1954 (811–7).

The seasonal history must be considered in sampling, and soil must be sifted through appropriate screens for accurate counts of first and second instars, though third-instar populations can be accurately separated by hand, sampling the latter being thus the quickest method. Third-instar populations may, however, be lower through mortality and major damage may be due to previous instars. Migration from the egg groups tends to a more even distribution as the insect develops, a point to be covered in the choice of sampling procedure. *From authors' summary.*

2004. Kamp, H. J. Lebensweise und Bekämpfung des Junikäfers. **[Biology and control of *Amphimallon solstitialis.*]** *Holz-Zbl.* 80 (151), 1954 (1789–90). 9 refs. [G.]

2005. Nitto, M., and Tachibana, K. **[The range of attraction of fluorescent lamps for the May-beetle. (II).]** *J. Jap. For. Soc.* 36 (8), 1954 (234–5). 6 refs. [Jap.jap.e.]

[Cf. *For. Abstr.* 14 (No. 3567).] The upper limit of attraction to beetles [*Anomala rufocuprea*?] was a distance of about 200 m., with a range of 175–250 m., from the lamp. [Tables and figures have English legends.] *From authors' summary.*

2006. Keller, E. Erfahrungen mit der chemischen Maikäferbekämpfung in der Schweiz. **[Chemical control of cockchafers in Switzerland.]** *Anz. Schädlingsk.* 27 (10), 1954 (147–52). 39 refs. [G.g.]

A review of operations since 1945 which have reduced populations to a point where no damage occurs, even to particularly susceptible crops. Spraying with γ BHC preparations proved the most efficient control measure.

2007. Dominik, J. Próba zwalczania trzyletniego pędraka chrabąszcza (*Melolontha melolontha* L.) preparatem 'Intox 8'. **[Trials of the preparation 'Intox-8' for controlling 3-year-old *M. melolontha* larvae.]** *Sylwan* 98 (3), 1954 (204–9). [Pol.]

When applied in summer at 100–400 kg./ha. this preparation [active agent unspecified] partly protects young trees from 3-year-old *M. melolontha* larvae, acting more as a repellent than as an insecticide. Better results are obtained by broadcasting than by putting it into furrows between the rows.

2008. Johnson, P. C. **A feeding record of the ten-lined June beetle.** *J. econ. Ent.* 47 (4), 1954 (717–8).

On *Pinus ponderosa* in Spokane more than half the needles in lateral branch terminal clusters were eaten by *Polyphylla decemlineata*, but not more than 1 beetle was found in any one cluster.

2009. Watts, J. G., and Hatcher, J. B. **White grub damage to young Pine plantations.** *J. econ. Ent.* 47 (4), 1954 (710–1). 3 refs.

Extensive damage to young Loblolly, Slash and Longleaf Pine plantations in S. Carolina was caused by larvae of *Phyllophaga prununculina.* The grubs attack the roots down to a depth of 6–8 in. If the damage is not fatal, the roots below this level may develop normally. Loblolly, being a shallow-rooted species, suffers the most serious losses. Initial damage is characterized by yellowing of the foliage and a decline in vigour. On dead and dying plants the entire secondary root system, and usually a part of the cambium of the tap-root has been eaten by the grubs. Experiments in control and prevention of damage are in progress.

Hymenoptera

2010. Bird, F. T. **The use of virus diseases against sawflies—with discussion.** *Report, 6th Commonwealth Entomological Conference, London* 1954 (122–5).

A short summary of work achieved in control of *Gilpinia hercyniae* and *Neodiprion sertifer*.

2011. Haliburton, W. **An introduced parasite *Exenterus amictorius* Panz. associated with *Neodiprion lecontei* (Fitch) in Quebec.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (5), 1954 (1–2).

The parasite was released in large numbers in 1942–9 for the control of the European Spruce sawfly (*Gilpinia hercyniae*); it has apparently now established itself as a parasite of *N. lecontei*.

2012. Wong, H. R. **Common sawflies feeding on White Birch in the forested areas of Manitoba and Saskatchewan.** *Repr.* from *Canad. Ent.* 86 (4), 1954 (154–8). 8 refs.

Notes on 12 species of sawfly common on *Betula papyrifera* in Manitoba and Saskatchewan with a key for identifying the late instars.

2013. Hussey, N. W. ***Megastigmus* seedflies infesting conifer seed.** *Rep. For. Res. For. Comm., Lond. 1952/53*, 1954 (120–1).

Notes are presented on the biology of *Amblymerus apicalis*, the main parasite of *Megastigmus*.

2014. El bachaco y métodos de combatirlo. **[Ants and their control.]** *Agric. venez.* 19 (169), 1954 (12–5). [Span.] A.P.B.

The most destructive of the ants of Venezuela are *Atta sexdens* and *Acromyrmex* spp. For chemical control of these pests, chlordane preparations are recommended as being the most easily handled and having the most lasting effects. Some types of treatment with commercial preparations are described and costs estimated.

Diptera

See also Nos. 1390, 1959–62.

2015. Kurir, A. Der Pseudoskorpion *Dactylochelifer latreillei* Leach als Säftesäuger der Larven von *Helicomyia saliciperda* Duf. **[*D. latreillei* as a predator of larvae of *H. saliciperda*.]** *Anz. Schädlingsk.* 27 (9), 1954 (137–8). 10 refs. [G.]

Laboratory observations confirm that *D. latreillei* [: Arachnidae] is predaceous upon larvae of *H. saliciperda*, but no data are forthcoming about the amount of biological control exercised in the field.

2016. Gauss, R. Gemeine Strahlenmücke, *Philia febrilis* L., als Buchen-keimlingstöter. **[*P. febrilis* as a destroyer of Beech seedlings.]** *Anz. Schädlingsk.* 27 (10), 1954 (152–4). 6 refs. [G.]

Beech seedlings in a nursery bed were found to have sustained damage by larvae of *Philia febrilis*, not previously reported as a forest pest. The larvae were probably conveyed to the seedbed in compost before sowing took place. They were easily destroyed by applications of petroleum.

459. *Other Animals*

See also Nos. 1406, 1969.

2017. Roonwal, M. L. ***Bactronophorus thoracites* (Gould) as a pest of living trees in the Sundarbans, Bengal (Mollusca: Teredinidae).** *Curr. Sci.* 23 (9), 1954 (301). 2 refs. A.P.B.

During a survey of the 24—Parganas Forest Division in the Sundarbans, Lower Bengal, this marine borer was found to be seriously damaging living trees in the forests of the Kankramari and Lothian Islands. Such damage probably occurs in all the coastal regions of the Sundarbans, that are subject to submergence during the spring tides. The borer makes vertical tunnels in the lower part of the stem and in part of the tap-root, weakening the tree and rendering it subject to windthrow. This is the first record of *B. thoracites* from India, and probably the first record of a molluscan marine borer damaging living trees.

2018. Schnell, R. Description de quelques galles d'Eriophyides recueillies en Afrique Occidentale. **[Description of some eriophyid galls found in West Africa.]** [*Proceedings*] *2ª Conferência Internacional dos Africanistas Ocidentais 1947, Lisbon* Vol. 2, 1950 (321–33). [F.]

The galls studied were found on *Acacia arabica*, *A. raddiana*, *Dichrostachys glomerata*, *Tamarindus indica* and *Zizyphus jujuba*.

2019. Galoux, A. L'apparition en Belgique d'un acarien parasite du genre *Picea* (*Paratetranychus ununguis* Jacobi). **[The first appearance in Belgium of *P. ununguis* on *Picea*.]** *Bull. Soc. for. Belge* 61 (10), 1954 (419–22). 3 refs. [F.]

The mite has been identified as causing damage to needles of *P. abies*, *P. pungens* and *P. engelmannii* in several parts of Belgium. The nature of the damage, and natural distribution, host plants and biology of the mite are discussed. Treatments similar to those for red spider in orchards (e.g. spraying with parathion and E.605) are recommended.

46. DAMAGE TO TREE GROWTH BY MAN

See also No. 1804.

2020. Steinbrenner, E. C. **The effect of tractor and hi-lead logging on the physico-chemical properties of some southwestern Washington soils in relation to natural regeneration.** *Abstr. of thesis*, in *Dissert. Abstr.* 14 (8), 1954 (1121–2). [University of Washington.] O.R.S.

Nine areas of tractor logging, 5 of them logged by tractors and high lead, were selected; each was adjacent to a stand of mature timber used as a control. On each study area 10 soil cores were taken from the timber and tractor logging area and 20 from the high-lead area, and soil permeability, bulk density and pore-space distribution were determined. Chemical analyses were made on 32 composite soil samples. In the regeneration survey 100 plots on each tractor area and 50 plots on each high-lead area were examined. In a study on the compacting effect of tractors, an HD20 tractor was passed over an undisturbed area of mature timber 10 times and soil cores were taken initially and after

each trip. Four trips over the dry soil or one over the wet soil reduced the permeability by 80% and the macroscopic pore space by 50%. Tractor logging reduced soil permeability 50% and decreased the content of macroscopic pores 23% as compared with the controls. Most of this reduction occurred on the tractor roads, 26% of the tractor-logged area. Tractor roads showed a slight loss and tractor cut-over and high-lead areas a slight increase in soil nutrients. Seedling stocking on tractor roads was low and the seedlings on roads were of poorer quality and less well grown than those on cut-over or high-lead areas.

48. INJURIES DUE TO UNKNOWN OR COMPLEX CAUSES

See also Nos. 1885, 1911.

2021. ZAK, B. **A study of soil aeration and other factors in relation to the littleleaf disease of Pine.** *Abstr.* in *Phytopathology* 44 (9), 1954 (511).

5. FOREST MENSURATION. INCREMENT; DEVELOPMENT AND STRUCTURE OF STANDS. SURVEYING AND MAPPING

52. MEASUREMENTS OF STEM DIMENSIONS AND VOLUME OF TREES, STANDS, FORESTS AND TIMBER

521. *Diameter (Girth) and Sectional Area*

See also Nos. 2026, 2051.

2022. HAMPF, F. E. **Relationship of stump diameter to d.b.h. for White Pine in the Northeast.** *For. Res. Note Ntheast. For. Exp. Sta.* No. 38, 1954. pp. 4. 5 refs.

Presents, on the basis of 823 measurements, a graph from the equation d.b.h. = 0·854 (stump diam. u.b.) + 0·910 (stump height) − 0·233.

2023. STOFFELS, A. L'exactitude de la détermination de la surface terrière par hectare à l'aide de la méthode de Bitterlich. **[The accuracy of determination of basal area per ha. by Bitterlich's method.]** *Ned. Boschb.-Tijdschr.* 26 (10), 1954 (256–68). 12 refs. [F.du.]

Discusses the main sources of error and their importance.

2024. CAROW, J. **Quick cruising with the Bitterlich angle-count method and a cumulative tally sheet.** *Mich. For.* No. 1, 1953. pp. 2 + sample tally sheet. 4 refs.

2025. FLEMMING, W. J. **A design for a relascope.** *For. Chron.* 30 (3), 1954 (284–6). 3 refs.

Short instructions for the use of the relascope for measuring basal area and description of a simple instrument made from an aluminium sighting blade bolted on to a telescopic leg from a camera tripod, which can be pulled out to the appropriate length.

522. *Height, Length*

See Nos. 2026, 2070.

523. *Bark*

See Nos. 2026, 2214.

524. *Determination of the Volume of Trees and Stands*

See also No. 2071.

524.1. Principles of Volume Determination. Form (Taper)

See also No. 2163.

2026. DUHOVNIKOV, JU. Sbegova tablica za belborovite nasaždenija u nas. **[Taper tables for Scots Pine stands in Bulgaria.]** *Nauč. Trud. lesoteh. Fak. selskostopan. Akad., Sofia* 2, 1953 (101–20). 9 refs. [Bulg.russ.]

The results of measurements on 170 sample plots, together with 80 height curves and 30 sample trees felled in middle-aged and maturing stands, were used for determining, in the first place: (1) mean diam.-frequency curves, (2) mean height curves, (3) mean form of stems, and (4) curves relating to the % distribution of volume in a stand. The graphs and tables obtained are discussed. It was found that for these stands 3 diameter-frequency curves (for mean diameters of 12·5, 20 and 40 cm.), are necessary. The mean height curves for middle-aged and maturing stands differ markedly from those for mature stands and are separately tabulated; no significant difference was found to exist in (u.b.) stem form of these age categories. Differences in bark thickness existed between different age classes, but only for the smaller diameters (< 50 cm.). Finally, the method of calculating from such data, taper tables for individual stands of given mean d.b.h. and height is explained and a single table given as an example.

2027. CHOJNACKI, W. Studia nad liczbą kształtu strzały drzew w drzewostanie sosnowym lasów Rogowa. **[Studies on the artificial form factor of stems in a Pine stand of the forest of Rogów [Poland].]** *Sylwan* 98 (3), 1954 (173–92). 23 refs. [Pol.pol.russ.]

The study was carried out in 1948 in a 1·5-ha. experimental plot in the Rogów forest: 543 trees were measured in a pure Pine stand (*Pineto-Piceeto-Quercetum* type), the mean age being 80 years and height varying from 18·08 to 28·48 m. The soil was crypto-podzolic, and the site (Schwappach) quality class 1. It was found that the coefficients of variation of different elements were as follows: quotient q_2 (ratio of mid-height diam. to d.b.h.), 6·3; height, 6·6; artificial form factor, 7·7; d.b.h., 18·4, crown ratio, 20·8. For trees of equal height, the artificial form factors increase with q_2; for trees of equal q_2, the form factors decrease as the height increases.

2028. RAWAT, A. S. **Mathematical equation for determining the stem timber form factor of *Tectona grandis*.** *Indian For.* 80 (9), 1954 (513–21 + 1 gph). 4 refs.

2029. STOEHR, H. A. **Stand conditions affecting form factor in Trembling Aspen.** *Abstr. of thesis*, in

Dissert. Abstr. 14 (8), 1954 (1122). [University of Michigan.] O.R.S.

Measurements were taken on 60 plots (50 trees each) representative of the range of site quality, age, and density in Aspen stands on the Huron National Forest, Michigan. Two trees for each of 4 crown classes were felled on each plot. Form factor (f.f.) was related to stand age, stand density index and site index by a linear regression equation; separate regression equations were computed for each crown class. The variables, age, site and density acting together resulted in a highly significant difference in average f.f. between stands; separately no one, or combination of two, variables had as much effect as the three, but, acting singly, site index showed the greatest effect, age less, and stand density no significant effect. Average f.f. decreased with increase in magnitude of the variables. The difference in f.f. between dominant, co-dominant and intermediate trees was very slight; the f.f. of suppressed trees was significantly higher. Co-dominant trees were least, and suppressed trees most, affected by the variation in stand conditions. It is concluded that the f.f. of co-dominant trees best represents that obtainable for Aspen within the climatic zone represented. As long as stand height is one of the variables measured in forest inventory work, site index need not be included.

524.3. Volume of Tree Groups and Stands

2030. Emrović, B. O izjednačenju pomoću funkcija, koje se logaritmiranjem daju svesti na linearni oblik s naročitim obzirom na upotrebu kod izrade drvnogromadnih tablica. **[Smoothing results by means of functions which can be presented in linear form, with special reference to the preparation of volume tables.]** *Glasn. šumske Pokuse* 11, 1953 (73–110 + 2 tbls.) 16 refs. [Croat.E.croat.e.]

2031. Andersson, S.-O. Funktioner och tabeller för kubering av småträd. **[Empirical formulae and tables for determining the volume of small trees.]** *Medd. SkogsforsknInst., Stockh.* 44 (12), 1954. pp. 29. 9 refs. [Sw.sw.g.] Price *Kr.*2.

The equations and tables are applicable to Pine, Spruce and Beech, measured under or over bark, with a maximum d.b.h. of 5 cm., in N., central or S. Sweden. [Cf. *For. Abstr.* 9 (No. 618).]

2032. Duff, G. **Volume tables for exotic coniferous species grown in New Zealand.** *For. Res. Notes N.Z. For. Serv.* 1 (12), 1954. pp. 39.

Combined taper and volume tables for *Pseudotsuga taxifolia*, *Pinus nigra* var. *calabrica* and *P. radiata*, in unthinned stands at Rotorua.

2033. Giordano, G. Tavola locale di cubatura del larice per le Alpe Occidentali. **[A local volume table for *Larix decidua* in the Western Alps [Province of Turin].]** *Ital. for. mont.* 9 (5), 1954 (254–8). [It.it.f.]

524.4. Recording of Data. Organization of Measuring Parties and Their Work

2034. Ennevaara, P. A. Reikäkorttimenetelmä ja sen käyttö metsätaloudessa. **[The punched-card system and its application in forestry.]** *Metsät. Aikak.* 1954 (11), (443–6). [Fi.e.]

Discusses the value of the system, which was used in Finland for the second national forest survey 1936–38, and was adopted by the Statistical Bureau and the Forest Surveying Department of the Forest Service in 1951 and 1954 respectively. *From author's summary.*

524.6. General Surveys of Forests and Whole Tracts of Forest. Partial Enumeration Surveys, Timber Cruising

See also Nos. 1728–9, 2034, 2039.

2035. Loetsch, F. Wesen und Anwendungsmöglichkeit der mathematischen Statistik in der Forstwirtschaft, speziell bei forstlichen Vorrats- und Zuwachsinventuren. **[Statistical method and its application to forestry, particularly in inventories and calculations of increment.]** *Schweiz. Z. Forstw.* 105 (11), 1954 (625–44). [G.f.]

A general review of the subject.

525. *Volume by Assortments. Merchantable Volume*

See Nos. 1815, 1903–5, 2061, 2085.

526. *Log Measurement. Scaling*

2036. Brown, R. M. **Some rules-of-thumb for obtaining the volume of small logs and pulpwood.** *Minn. For. Note* No. 33, 1954. pp. 2.

Explains and illustrates the use of 3 rules-of-thumb: (1) Bd. ft. volume of 1-in. lumber

$$= \left(\frac{d-1}{10}\right)^2 \times \frac{\text{log length in ft.}}{2}$$

where d = average scaling diameter in in. (2) Cu. ft. volume of 100-in. bolts $= \frac{0{\cdot}1\,d^2}{2}$ — (0·1 of the first term) where d = mid-diameter of the bolt in in. (3) If 90 cu. ft. is assumed for the volume of wood in a standard cord, volume in standard cords $= \frac{1}{2}\left(\frac{d^2}{1000}\right)$ where d = average mid-diameter of bolt in in.

527. *Solid Volume of Stacked Products*

See also No. 2036.

2037. Vorreiter, L. Mess- und Rechnungswerte für Rundhölzer. **[Measured and calculated values for wood in the round.]** *Forstwiss. Cbl.* 73 (5/6), 1954 (179–84). 12 refs. [G.]

Many practical experiments have been undertaken to obtain exact information on the relationship between the diameter of small wood in the round and the number of the billets, for the purpose of estimating the solid content of wood per cu.m. of stacked wood. The extent of, and reasons for, discrepancies between measured and calculated values are discussed.

2038. Perkins, P. C., Robbins, W. C., and Young, H. E. **Pulpwood measurement time study.** *Tech. Note Univ. Me. For. Dep.* No. 32, 1954. pp. 2.

A small-scale time study of 2 methods of measuring a stack of pulpwood and calculating its volume showed that cu. ft. measurement involving measurement of each bolt in the pile took twice as long as cord measurement. Results are shown in graphs.

53. SPECIAL MEASUREMENTS OF TREES AND STANDS (CROWN DIMENSIONS, STAND DENSITY ETC.)

See also No. 1528.

2039. STRAND, L. Mål for fordelingen av individer over et område. [**A measure of the distribution of individuals over an area.**] *Medd. norske Skogforsøksv.* 12 (2), (No. 42) [1953?], (191–207). 12 refs. [Nor.nor.e.]

In the sample-plot method, the results depend on the size of the plots if the individuals are not distributed at random. A new method has been suggested based on the laying out of N points from which the distance D to the nearest individual is measured. The relative number of points with a distance above a figure D' can be used to calculate the relative number of empty circles with an area of $\pi D'^2$, and this estimate has been found to be as accurate as one obtained directly by laying out N circles and determining the % absence of individuals. Four examples of the use of the method are given. Tables and diagrams have English legends.

54. ASSESSMENT OF SITE QUALITY

See also Nos. 1491, 1530, 2065.

2040. ZLATARIĆ, B. Neki taksacijski elementi jele i bukve u odnosu na ekologiju i razdiobu šuma na Risnjaku. [**Some mensurational factors [tree height and diameter increment] of Silver Fir and Beech in relation to ecological factors and forest distribution on Mt. Risnjak.**] *Glasn. šumske Pokuse* 11, 1953 (111–62+1 map). 10 refs. [Croat.croat.e.]

A study of these species in the principal forest types of Mt. Risnjak shows that tree height and diameter increment differ considerably on different site types. The tallest Firs (32–40 m.) are found in (*a*) the *Abieto-Blechnetum*; their height is 21–38 m. in (*b*) the *Fagetum abietetosum*, and 14–19 m. in (*c*) the *Abieto-Pinetum calamagrostidis*. The diameter m.a.i. of Fir is greatest in (*b*) and least in (*c*), but the largest stems in (*a*) have a greater m.a.i. than those in (*b*). Beech reaches a height of 17–38 m. in (*b*), and 8–19 m. in the *Fagetum subalpinum*. During the last 2–3 decades the increment of both species has mostly decreased, owing to a series of drought years, but the effects were widely different on different sites, and in (*a*) an increase is noted.

2041. LOSEE, S. T. B. **Site classification at Abitibi woodlands laboratory.** *Pulp Paper Mag. Can.* 55 (11), 1954 (168 . . 174). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1404 (*E*-2).)

Using bases designed to cover silvicultural conditions generally as well as the probable performance of various species (ground cover and height growth of Black Spruce, Jack Pine and Aspen), gives a tentative table showing 3 levels of fertility and 5 of soil moisture. The 7 sites so far determined are described in detail.

2042. DINGLE, R. W., and BURNS, P. Y. **Relationship of Shortleaf Pine growth to soil properties.** *Res. Bull. Mo. agric. Exp. Sta.* No. 541, 1954. pp. 11. 20 refs.

An intensive study of soil conditions related to the growth of 12- to 16-year-old planted *Pinus echinata* was conducted in 1952 at the Ashland Wildlife Research Area, Missouri. Soils were largely silty loams derived from loess. The main results of the study were: (1) 72% of the variation in site quality was associated with differences in the thickness of, and % of clay in, the A horizon. (2) A formula was derived showing the relation between height growth and these factors—height m.a.i. = 1·05 + 0·0192 (thickness of A horizon) + 0·0157 (% of clay in A horizon). (3) Differences in subsoil characters were not related to site-quality variation. (4) The best sites had the lowest organic matter and pH in their A horizons, probably because rapid Pine growth promoted soil acidity and diminished incorporation of organic matter into mineral soil. (5) The numbers of fine roots in the A and B horizons were related to A-horizon thickness. No other soil characteristic studied appeared to affect the number of fine roots appreciably. [Cf. *For. Abstr.* 15 (No. 1652).]

2043. GUPTA, R. S. **Characteristics of soils and site conditions with reference to their suitability for the growth of Sal (*Shorea robusta*) and its natural regeneration.** *Indian For.* 80 (10), 1954 (588–600). 6 refs.

Presents and discusses data from a soil survey in Sal areas in the forests of Ramnagar and Haldwani. The main finding was the overwhelming importance of adequate soil moisture and good drainage.

56. INCREMENT, DEVELOPMENT AND STRUCTURE OF STANDS

See also Nos. 1492, 1495, 1528, 1602, 1605, 2035.

2044. JANKAUSKAS, M. A. Rasprostranenie vidov listvennicy v Litovskoĭ SSR. [***Larix* species in the Lithuanian SSR.**] *Lesn. Hoz.* 5 (2), 1952 (80–4). [Russ.]

L. decidua is the species chiefly met with in Lithuania, *L. sibirica*, *L. leptolepis*, *L. sukaczewii*, *L. kurilensis*, *L. polonica*, *L. americana* and *L. eurolepis* being found only in parks and gardens. The first four species and *L. eurolepis* deserve special attention, having successfully withstood the severe winters of 1915/16, 1928/29 and 1939/40 when January temperatures dropped as low as − 28·8 to − 42° C. The best growth rate for *L. decidua* (whether pure or in mixture with Pine and Spruce) has been recorded on sites of the *Oxalis* type (morainic clay-loam and clay soils covered by a thin layer of sand and sandy loams) on which at 100 years old its standing volume is known to have reached 1104 cu.m. [per ha.?]. On *Myrtillus* sites (clay loams and clayey soils over a deep layer of coarse loess sand) the rate of growth is slower. As the dimensions of Larch on both types of soil are comparable at 60–70 years old to those of 120-year Pine and at 50–60 to those of 100-year Spruce, its cultivation would enable rotations to be reduced by ca. one-half. Natural regeneration of Larch is

tabulated for plots both in the open and under canopy; it was most abundant on burnt-over clear fellings where the soil had been loosened The article includes 3 graphs comparing the height, diameter and volume growth of *L. decidua*, Scots Pine and Norway Spruce on the two site types.

2045. CARBONNIER, C. Några exempel på produktionen i planterad granskog i södra Sverige. **[Yield studies in planted Spruce in S. Sweden.]** *Medd. SkogsforsknInst., Stockh.* 44 (5), 1954. pp. 59. 13 refs. [Sw.sw.e.] Price *Kr.*3.

Presents the results of thinning experiments on 5 series of experimental plots, over a period of 25–45 years. Thinning (various grades of low and crown) was generally done at about 5-year intervals, but, owing to the limited material, valid conclusions can be drawn only for heavy crown, heavy low and self thinning. These include the following: (1) B.a. increment for self-thinning was 75–80% and for heavy crown thinning about 95% that for heavy low thinning; (2) the c.a.i. had not reached, or at least had not passed its peak in the oldest (75-year) stands; (3) the p.a.i. over 5–6 thinning periods was about the same for heavy low thinning and for self-thinning, and about 5% lower for heavy crown thinning; (4) volume yield from timber < 10 cm. diam. decreased with increasing plant spacings but seemed to be independent of type and grade of thinning; (5) yield value and capital value from self thinning was considerably below that from the active thinnings; (6) capital value at 2, 3 and 4% interest increased steadily with age for all the actively thinned plots. Experimental data and results are given in graphs and tables with English legends.

2046. BRAATHE, P. Undersøkelser over utviklingen av glissen gjenvekst av gran. **[Investigations on the development of [unthinned] sparse regeneration of Spruce.]** *Medd. norske Skogforsøksv.* 12 (2) (No. 42) [1953?], (209–301). 43 refs. [Nor.nor.e.]

Measurements on felled trees were made in 18 unthinned Spruce stands between 41 and 60 years old, of d.b.h., height, age at breast height, breadth of annual rings, bark thickness, and branch thickness, and estimates were made of the height and d.b.h. at 10-year intervals back from the age at time of measurement. As the plots had not been thinned, apart from a limited amount of self-thinning in the denser stands, it was possible to determine the amount of regeneration present at the plant stage. The plots were divided into 2 × 2 m. squares, and the number of squares without any regeneration (zero squares) at this stage is expressed in % of the total number of squares. The total volume yields for the different plots calculated at 55% of the rotation period were compared with yield tables for thinning grade II. Yields proved to exceed the yield-table figures for a zero-square % < 20 and to decrease steadily below the table figures with increasing zero square % > 20. Calculations were also made of the supplementary regeneration 12–13 years old (height about 1·3 m.). Taper increased and wood quality (number of branches, branch thickness and wood density) decreased with increasing zero-square %. For four of the plots (2 of poor and 2 of moderate density) probable volume yields were calculated to the end of the normal rotation; these figures can be used directly for predicting yields of stands with an average height of 1·3 m. or over, but some allowance for supplementary regeneration will be needed in younger stands. A zero-square % of 50 would probably give a final total volume yield of 82–87% of normal, and one of 75, 52–58% of normal. No clear tendency was found for the effect on yield of the grouping together of zero-squares or for variations in tree height within the plot. There is a 5-page English summary and legends to graphs and tables are in English and Norwegian.

2047. SOMES, H. A., and MOORHEAD, G. R. **Do thinning and prescribed burning affect the growth of Shortleaf Pine?** *For. Res. Note Ntheast. For. Exp. Sta.* No. 34, 1954. pp. 2.

An examination 8 years after a thinning in 38-year-old Pine on an old field in which 34% by number or 20% by b.a. was removed, showed that thinning reduced mortality and that (for the 75 largest trees) diameter per tree was not affected by thinning, while b.a. and volume/acre were both slightly lower than on unthinned plots. Both thinned and unthinned plots on which controlled burning took place showed higher diameter and volume growth than unburned controls.

2048. ALLISON, J. H. **Growth of planted Norway (Red) Pine in northern Minnesota.** *Minn. For. Note* No. 34, 1954. pp. 2.

The following conclusions are drawn from measurements in 50-year-old plantations of *P. resinosa*: (1) Stand density (ranging from 225 to 500–600 trees/acre at ages of 20–40 years) has had little influence on height and form of dominants and co-dominants. (2) Pruning in the most open stands has brought as good quality growth as combined thinning and pruning in denser stands. (3) Denser stocking has given considerably greater cu. ft. and bd. ft. volume production. (4) Less dense stocking has given larger trees and therefore increased value/1000 bd. ft., offsetting to some extent the lower volume production.

2049. ERTELD, W. VON. Die Einwirkung des Buchenunterbaus auf die Ertragsleistung von Kiefernbeständen. **[The effect of underplanting Beech on the yield of Scots Pine.]** *Arch. Forstw.* 2 (2/3), 1953 (97–141). 21 refs. [G.g.]

Using data from comparable plots at Eberswalde and Darss, yield tables, and felled stems, the author shows that in pure Pine the height, b.a. and form factor are generally greater than in Pine underplanted with Beech. Removal of a 30-year Beech underwood was followed in the Pine by increases in height, diam., and b.a. increment, which held for a long period. It was nowhere established that underplanting with Beech improved the growth of Pine. In the Beech understorey, height and diam. growth is similar to that of pure Beech, and since stem numbers in the 80-year sample were also similar, there is no apparent shade effect from the overwood. High density in the Beech itself is a more important cause of check to its own height growth. The stand b.a. of the Beech understorey

thinned at 70 years was about 32% lower than that of the unthinned Beech understorey and as a result of fewer stems and lower mean diam. it was considerably less than that of pure Beech and about 29% higher than that of Beech in even-aged mixture. There is however on suitable sites a very considerable increase from the combined volumes of Pine and Beech, compared with the total production of pure Pine.

2050. **Research results: the coastal plain.** *Carib. For.* 15 (1/2), 1954 (2–7). (*Rep. U.S. trop. For. Exp. Sta.* 14, [1953?].)

Work in two types of problem area in the Puerto Rican coastal plain is reviewed. (1) The humid limestone area, with data on growth and on the results of underplanting. An infection of mistletoe (*Phthirusa* sp.) in *Montezuma speciosissima* plantations has almost completely disappeared through suppression. (2) Mangrove area (mainly *Laguncularia racemosa*), with data on stand development after thinning. Management studies indicate clear felling in strips as the most suitable system for this type.

561. *Increment in Height, Diameter, Basal Area, Form and Quality. Variations and Trends; Dendrochronology*

See also No. 1506.

2051. KEYLWERTH, R. Die Genauigkeit quantitativer Zuwachsanalysen. **[The accuracy of quantitative increment analyses.]** *Holz Roh- u. Werkstoff* 12 (2), 1954 (41–4). [G.g.]

The accuracy of quantitative determinations of diameter increment and b.a. increment, based on the width of growth rings, is limited not so much by the actual accuracy of measurement (0·01–0·1 mm.) as by excentricity. Results of measurements of the growth-ring width in a *Pseudotsuga taxifolia* disk (57 rings) along 40 radii (10 pairs of diameters at right angles to one another) showed an S.D. [standard deviation] of ± 0·75 mm. when the 2280 results were treated individually, ± 0·30 mm. when they were combined in pairs along the same diameter, and ± 0·19 mm. when they were grouped in fours at right angles to one another. The S.D. for groups of 5 consecutive growth rings was ca. 4·5, 3·5, 3·0 times as great as for one-year rings, and the figures for groups of 10 consecutive rings were ca. 8·5, 4·0, 4·0 times those for one-year rings (the 3 figures referring to single rings, pairs, and fours). The coefficients of variation of the b.a. increment calculated from the diameter and ring-width values, were ± 24·9, 10·1 and 6·5% for single-year rings, ± 21·6, 7·1 and 4·2% for five-year groups, and ± 19·4, 4·2 and 3·3% for 10-year groups, the three figures referring again to single rings, pairs, and fours.

2052. FRITTS, H. C., and FRITTS, E. C. **A new dendrograph for recording changes in the outer radius of a tree.** *Abstr.* in *Bull. ecol. Soc. Amer.* 35 (3), 1954 (60). A.P.B.

A new dendrograph designed to measure a single outer radius of a tree has been developed. It operates on the same principle as a dial-gauge dendrometer except that it is equipped with a constant recording mechanism. The dendrograph is mounted kinematically on 3 lag screws inserted into the xylem of the tree. A simple lever system magnifies the differential movement between the screws and the outer surface of the bark 100 times and records the movement on a standard Friez rain-gauge clock.

2053. GIDDINGS, J. L., JR. **Tree-ring dating in the American arctic.** *Tree-Ring Bull.* 20 (3/4), 1954 (23–5).

Discusses the peculiarities of arctic dendrochronology and its applications to e.g. the dating of sea currents.

2054. GHENT, A. W. **The treatment of decayed wood from dead Trembling Aspen trees for growth-ring analysis.** *For. Chron.* 30 (3), 1954 (280–3).

This paper elaborates certain procedures briefly outlined in an earlier article [cf. *For. Abstr.* 14 (No. 2537)]. Although dry wood from dead Trembling Aspen has been found best suited to growth-ring analysis, in its absence use has been made of water-saturated wood from the underside of fallen trunks. A technique of wax impregnation, adaptable to wood in both early and advanced stages of decay, is described. Rapid impregnation with near-boiling wax is sufficient to facilitate transverse sectioning of relatively sound wood; advanced decays require a slower impregnation with cooler paraffin. Hot xylol is used to remove the wax and flatten the section. Successive, overlapped sections provide an extended series of measurements to establish the orientation in time of mortality. Incomplete rings for the years just prior to death are checked by measurement of the outer growth at additional points. *Author's summary.*

2055. KLEPAC, D. Tablice postotka prirasta. O nekim mogućnostima određivanja postotka prirasta. **[Increment % tables. Some possibilities of determining the increment %.]** *Šum. List* 78 (9/10), 1954 (454–85). 22 refs. [Croat.croat.f.]

Fairly good agreement exists between Algan's 'rapid' and Schaeffer's 'slow' volume 'tariffs' [cf. *For. Abstr.* 11 (No. 749)] on the one hand, and the tariffs used in Jugoslavia on the other. Combination of Pressler's increment % formula with 'slow' tariffs yields the formula

$$p\ (=\text{b.a. increment }\%) = \frac{1000}{d} \times \frac{1}{n},$$

which can be used to determine the volume increment % of old trees and stands with little height growth. In combination with 'rapid' tariffs it gives

$$p\ (=\text{volume increment }\%) = \frac{1000}{d-5} \times \frac{1}{n},$$

which is particularly suitable for young trees, and for young or selection-forest stands. In these formulae d is d.b.h. in cm., and n is the number of annual rings in the last 2·5 cm. of growth (i.e. the *temps de passage*). To facilitate calculation, the author gives two tables based on these formulae from which b.a. and volume increment %s can be read off, using n (5–40) and d.b.h. (15–100 cm.) as

entries. The practical application of the method is discussed and some examples are given.

562. *Volume Increment*

2056. Iliev, A. Vărhu proizvoditelnostta na belija bor, smărča i elata i preporăki za podobrenie na dărvoproizvodstvoto v UOGS 'Georgi St. Avramov', m. Jundola, Velingradsko. **[Yield of *Pinus sylvestris, Picea abies* and *Abies alba* and recommendations for improving the yield of stands in the 'G. St. Avramov' experimental forest unit at Jundola, Velingrad district.]** *Nauč. Trud. lesoteh. Fak. selskostopan. Akad., Sofia* 2, 1953 (143–54). 3 refs. [Bulg.russ.]

Yield was investigated on 86 sample plots, and for the age classes 80, 100 and 120 years. It was found that on best site classes, Fir had the highest, and Pine the lowest yield, the difference increasing with age. Recommendations are given for improving the composition and density of the stands, which might perhaps increase the yield by 25%. Some figures are also included for height to living crown.

2057. Watt, R. F. **Mortality in second-growth stands of the Western White Pine type.** *Res. Note Intermt. For. Range Exp. Sta.* No. 9, 1954. pp. 5.

Records from 38 permanent sample plots showed mortality to be extremely variable. It increased with volume and age of stand and, when measured in bd. ft., with site index. At 100 years, 10% of the total bd. ft., 22% of the cu. ft. and 30% of the b.a. production had been lost. Wind and snow caused half the mortality and suppression, insect and diseases were also important. Although $\frac{3}{8}$ of the total bd. ft. mortality was in trees of merchantable size, 10·6 in. d.b.h. and over, salvage operations are unlikely to be economic, because of the small volumes available for salvage annually. *From author's summary.*

2058. Kuusela, K. Zur Theorie der forstlichen Zuwachsberechnung auf Grund der periodischen Messung. **[The theory of determining forest increment on the basis of periodic measurement.]** *Acta for. fenn.* 60 (1), 1953 (1954). pp. 136. 117 refs. [G.]

Reviews the various methods of calculating mean increment, increment %, and current annual increment, for single trees and for stands, with special reference to methods involving periodic remeasurement.

565. *Sample-Plot Technique*

See also No. 1694.

2059. Barker, C. S. **Analysis of the growth measurements of young *Pinus radiata* D. Don. I. An introductory account of three observation plots at Athenree, Bay of Plenty.** *N.Z. J. For.* 6 (5), 1953 [1954], (400–4).

It is suggested that by establishing sample plots at a very early stage, important data may be obtained that are irrecoverably lost before conventional sample plots are established, and that it may be possible to discover criteria for forecasting future growth from seedlings or very young trees.

2060. Lewis, N. **Permanent sample plot practice in South Australia.** *Aust. For.* 18 (1), 1954 (21–9). 3 refs.

A description of the method of establishing and measuring permanent sample plots in the State *Pinus radiata* plantations of S. Australia, with notes on equipment used, and rate and accuracy of measurement. *Author's summary.*

566. *Yield Tables and Their Construction*

See also Nos. 1491, 2076.

2061. Lewis, E. R. **Yield of unthinned *Pinus radiata* in New Zealand.** *For. Res. Note N.Z. For. Serv.* 1 (10), 1954. pp. 19 + 11 gphs. 2 refs.

It has been found possible to prepare a yield table for *P. radiata*, which is applicable to unthinned stands throughout New Zealand. It takes the form of a 'variable density yield table' and is presented in a series of alignment charts. There are also included stand and stock tables as well as data on mean diameter growth and the relation between merchantable and total volumes.

2062. Ferguson, J. H. A. **Growth and yield of *Pinus merkusii* in Indonesia.** *Commun. For. Res. Inst., Bogor* No. 43, 1954. 9 refs. [E.e.] (*Repr.* from *Tectona* 43, 1953 (21–36).)

P. merkusii is indigenous in North Sumatra and has been planted extensively throughout Sumatra and Java. From data from a number of sample plots (incomplete, owing to the war) a yield table has been computed for even-aged, pure stands, for 5 site-quality classes, and for ages up to 35 years. For the average site quality, and the usual spacing (3 × 3 m.) the m.a.i. culminates at the age of 25 years with 22·4 cu.m./ha. (320 cu. ft./acre) 'thick-wood' (down to 7 cm. diam.) volume u.b. (Bark volume averages > 20% of total volume o.b.) Annual production depends on initial spacing, ranging from 26 cu.m./ha. at 20 years for 2 × 2 m. spacing to 19 cu.m. at 25 years for 4 × 4 m. spacing.

2063. Davidov, M. V. Hod rosta somknutyh bukovyh nasaždenií. **[Yield tables for Beech growing in closed canopy.]** *Lesn. Hoz.* 5 (4), 1952 (48–51). [Russ.]

Presents a yield table constructed by the Lwow Agricultural and Forestry Institute (data obtained from 1125 sample plots of quality classes Ia, I and II) for natural [unmanaged] Beech stands in the Ukrainian Carpathians, indicating natural mortality instead of thinnings. The volumes for quality classes III and IV can be calculated from a formula based on an empirical ratio between the mean height (for Beech stands of 15 m. and upwards) and volume (including mortality), viz. $M = (2H - 10)\,P$ where: M = volume in $\frac{1}{10}$ cu.m./ha.; H = mean height in m.; P = density of stocking. The table should be used in this region instead of Gerhardt's, which give an average minus error of 14–15% for the volumes of quality classes I and II.

2064. Sirakov, H. T. Opitni tablici za niskostăbleni nasaždenija ot zimen dăb. **[Yield tables for *Quercus sessiliflora* coppice stands [in Bulgaria].]** *Nauč. Trud. lesoteh. Fak. selskostopan. Akad., Sofia* 2, 1953 (121–42). 4 refs. [Bulg.russ.]

Presents yield and assortment yield tables for Oak coppice stands (age up to 50 years; 5 quality classes), based on data from 41 sample plots on 20 of which

the whole stand was felled and measured after felling, and from growth analyses of 119 sample trees. Two tables contain data on bark % and the % distribution of bark in different portions of the stem.

567. *Stand Tables*

See also Nos. 2061, 2076.

2065. MATHAUDA, G. S. **Relationship between the average diameters of the main and the subsidiary crops in the case of plantation Teak (*Tectona grandis* Linn.f.).** *Indian For.* 80 (11), 1954 (707–8 + 2 gphs. + 1 tbl.).

Average diameters of thinnings were plotted against those of main crop, for 4 site qualities and 2 grades of thinning. The distribution of points indicated that the relationship is independent of both site quality and thinning grade within the range of C and D grades of ordinary thinnings.

2066. Biologie forestière. **[Forest biology.]** *Rapp. Inst. nat. Étude agron. Congo belge 1953*, 1954 (225–7). [F.]

A girth-distribution table in 20-cm. classes of 35 species of dominants, 33 of dominated and 40 of shrubs on 4·25 ha. on the plateau at Ntanda Nsansa (Lower Congo). Dominants include *Antiaris africana, Chlorophora excelsa, Entandrophragma angolense, Pentaclethra eetveldeana, P. macrophylla* and *Pseudospondias microcarpa.*

568. *Other Mensurational Studies of Stand Constitution and Changes Therein. Distribution of Growth by Tree Classes etc.*

See No. 2076.

58. SURVEYING AND MAPPING. AERIAL SURVEYS

585/588. *Aerial Reconnaissance and Survey*

See also Nos. 1561, 2090.

2067. GRANDJEAN, A. J. Het gebruik van luchtfoto's in de bosbouw. Studiereis naar West-Duitsland. **[The use of air photographs in forestry. A study tour in W. Germany.]** *Ned. Boschb.-Tijdschr.* 26 (9), 1954 (223–32). 14 refs. [Du.g.]

Discusses air photograhy in general, practice in Germany and its relation to conditions in the Netherlands.

2068. LANDIS, G. H., and MEYER, H. A. **The accuracy of scale determinations on aerial photographs.** *J. For.* 52 (11), 1954 (863–4).

Scale check lines were measured (*a*) towards the edges, across and along the flight line and across the corners, and (*b*) near the centre of the photographs, diagonal to, across and along the line of flight; (*b*) gave the best results and these were greatly improved by averaging a pair of lines crossing at right angles. The standard error of the scale factor thus obtained was 0·3% for the 1/20,000 and 0·2% for the 1/12,000 photograph.

2069. TRYON, T. C., and YOUNG, H. E. **Dot gridding air photos.** *Tech. Note Univ. Me. For. Dep.* No. 31, 1954. pp. 2.

A study on aerial photographs with a scale of 40 chains/in. using grids with 4, 8, 16 and 25 dots/in. to determine the area of each forest type. There was a decrease in accuracy with 4 and 8 dots, but it is concluded that satisfactory results, especially for large areas, can be obtained with 4 dots/in.

2070. TOMAŠEGOVIĆ, Z. Stereometer kao visinomjer. **[Stereometers [parallax bar, parallax wedge] as hypsometers.]** *Šum. List* 78 (8), 1954 (393–401). 10 refs. [Croat.croat.e.]

When determining tree heights stereoscopically by means of the formula

$$\Delta h = \frac{h}{b^1}\,\Delta p_a$$

where Δh is the tree height measured from stereophotographs; h, the flying height; b^1 length of the projection of the photogrammetric base, and Δp_a, the parallax between the top and foot of the tree, it is always important in hilly country to reduce h and b^1 numerically to the mean altitude of the stand. The Zeiss-Aerotopo parallax bar gives a single-observation mean height error of ± 2·6 m., and the parallax wedge (on a transparent 'Astralon' sheet) one of ± 3·4 m.

2071. DAHL, B. **Assessment of standing timber volumes from aerial photographs.** *Aust. For.* 18 (1), 1954 (5–14).

An area of 50,000 acres of Boola Boola State Forest in Victoria was photographed from the air early in 1953. Contour and topographical maps were prepared and, from photo interpretation and ground sample plots, maps showing forest types and volume of available pulpwood were compiled. The relationship between d.b.h. (*D*), tree height (*H*), and crown width (*C*) was determined and expressed as

$$\frac{D}{\sqrt{H \times C}} = \text{constant} = k,$$

and a formula for a single-stem volume (*V*) was developed by elimination of diameter, giving

$$V = H^2 \times C \times K$$

where *K*, the tree factor, is $\pi/4\ Fk^2$, *F* being the form factor. Plot volumes were obtained by measurement of the stem volume of a number of individual trees and multiplying the mean stem volume by the number of trees on the plot. Photo volumes and ground volumes have been closely correlated. *Author's summary.*

2072. TRAPNELL, C. G. **The uses of aerial photography in vegetation, soil and land use surveys.** *Proceedings of the Nairobi Scientific and Philosophical Society, Nairobi* 6 (1), 1952 (17–20). L.S.

Discusses briefly its application to African conditions.

2073. SAMOĬLOVIČ, G. G. Primenenie aviacii dlja učeta cvetenija sosnovyh nasaždeniĭ. **[Visual aerial reconnaissance for surveys of flowering in Pine stands.]** *Lesn. Hoz.* 5 (4), 1952 (58–60). [Russ.]

Aerial reconnaissance of flowering in Pine for the prediction of seed crops was tried in the Okhta Experimental Leskhoz and found quite satisfactory. Flowering was estimated visually by a 5-point scale. The plane was flown 100 m. above the crowns. The small area of the Pine stands (majority 1–2 ha.) greatly facilitated the work and about 1000 ha. were surveyed in the course of one flying hour.

6. FOREST MANAGEMENT. BUSINESS ECONOMICS OF FORESTRY. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

61. FOREST MANAGEMENT: GENERAL, THEORY AND PRINCIPLES

See also Nos. 1770, 2085.

2074. MARTINS, E. A. DOS SANTOS. Para o ordenamento em jardinagem. Um aspecto da lei exponencial na distribuição do número de pés de árvores por classes de D.A.P. em povoamentos. **[Management of selection forest. An aspect of the exponential law of the distribution of stem numbers by diameter classes.]** *Estud. Inform. Serv. flor. aqüic. Portugal* No. 35-*E*3, 1954. pp. 18. 6 refs. [Port.] Limited distribution.

2075. REYNOLDS, R. R. **Growing stock in the all-aged forest.** *J. For.* 52 (10), 1954 (744–7).

Discusses correct diameter distribution in selection forest, using *Pinus taeda* as an example.

2076. PETKOV, P. D. Izučvanija vărhu tehničeskata zrelost na belborovite gori u nas i preporăki za opredeljane turnusa na sečta v tjah. **[Investigations relating to the technical maturity of *Pinus sylvestris* forests in Bulgaria, and methods recommended for determining the rotation in these forests.]** *Nauč. Trud. lesoteh. Fak. selskostopan. Akad., Sofia* 2, 1953 (5–50). 9 refs. [Bulg.russ.]

Data from 105 plots in the Rila-Rhodope forests, smoothed with the aid of Tjurin's yield tables, were used for preparing fresh tables showing mean height, diameter, number of trees and stem volume/ha. at density 1·0 for site qualities I to V and ages from 50 to 140 years. The main difference between these and Tjurin's tables consists in the greater diameter indicated in the former for a given height. The volume/ha. figures for each site quality were then worked out by age classes, showing total volume, volume m.a.i., and c.a.i. for each class (with and without bark), and for each of 7 assortment classes (Ia, I–VI). Next, the assortments were grouped by top diameter into (i) 4 groups—(*a*) > 30, (*b*) 18–29, (*c*) 11–17, (*d*) 3–10 cm., or (ii) 2 groups—(*e*) > 18 and (*f*) 3–17 cm. Method (i) gave values for technical maturity as follows: (*a*) 130 to > 140, (*b*) 80–120, (*c*) 50–80, and (*d*) < 50 to 60 years. Method (ii) gave: (*e*) 90 to 140 and (*f*) < 50 to 60 years. In both cases the period increases with decreasing site quality. Determination of the [technical] rotation should be based on analyses such as these. If the age-class distribution in the stand is relatively uniform, the rotation can be taken as equal to the technical maturity; if mature and overmature stands preponderate, the rotation should equal the upper limit of technical maturity; if young and medium-aged stands preponderate—its lower limit.

62. WORKING PLANS. ANNUAL OR PERIODIC YIELD. YIELD REGULATION

See No. 1583.

65. SPECIAL BUSINESS PROBLEMS OF TIMBER-GROWING. CALCULATION OF COSTS AND PROFITABILITY. VALUATION

See also Nos. 1491, 1601, 2045, 2076.

2077. VINÇONNEAU, V.-R. Indice de rentabilité des travaux exécutés par contrats du Fonds Forestier National. **[Calculating the index of profitability for works executed with financial assistance from the F.F.N.]** *Rev. for. franç.* 6 (11), 1954 (667–74). [F.]

Discusses the concept of profitability in the narrow sense demanded for repayment of loans, subsidies etc., made by the Fonds Forestier National to private landowners, when the works are carried out by the Administration des Eaux et Forêts. Three formulae are developed:

$$(1) \qquad P = \frac{2\,(C + i)}{1 - k}$$

where P is the value of minimum quantity of products to be marketed in order to reimburse the F.F.N. plus simple interest and costs of supervision; C is the total capital expenditure by the A.E.F.; k is a coefficient for the costs of supervision; and i the sum of simple interest at 0·25%. The plantations are considered to be 'profitable' (i.e. ready for repayment of loans etc.) when $P < R$ (the value of gross receipts from compartments stipulated in the contract, over a given acceptable period). The ceiling for C is calculated from the formula

$$(2) \qquad C < \frac{R\,(1 - k)}{2 + 0{\cdot}05\,n}$$

where n is the presumed age of the plantations at the time of the last coupe made by the Administration before handing over the management to the owners. Finally, an 'index of profitability' (I) is developed from:

$$(3) \qquad I = \frac{n\,C\,(2 + 0{\cdot}005\,n).}{50\,R\,(1 - k)}$$

The application of formula (3) is illustrated by an actual example.

2078. BARTON, J. H. **How much does it cost to plant trees?** *For. Fmr.* 14 (2) ,1954 (4–5).

Data were collected by the T.V.A. on 76 planting jobs scattered over the Tennessee Valley, some using hand and others machine planting, some done by the owner himself and others by hired labour. Costs ranged from $2·50 to $20·00 and averaged $9·00/acre. Costs were almost unaffected by site factors, and variation was mainly due to availability of labour and machines, local bargaining conditions etc.

2079. DAVIS, K. P. **Comparative valuation in forest management.** *Repr.* from *Pap. Mich. Acad. Sci.* 39, 1953 (1954), (143–9).

Discusses the need for exact data in making analytical comparisons of costs and returns, with two illustrations: (1) costs and returns from pruning two White Pine trees, and (2) costs and returns from growing Christmas trees in southern Michigan.

2080. ENGLE, L. G. **Some cost aspects of pruning Red Pine.** *Repr.* from *Pap. Mich. Acad. Sci.* 39, 1953 (1954), (151–7). 2 refs.

Presents data on methods and figures for costs of pruning *Pinus resinosa* in Michigan.

2081. SANGAR, O. J. **The utilization of thinnings.** *Quart. J. For.* 48 (4), 1954 (261–6).

Discusses the economics of thinning theoretically and stresses the value of the advice of timber merchants to foresters deciding when and how to thin.

2082. JØRGENSEN, F. Nogle prisberegningssystemer og deres annvendelse ved grundværdiberegning. **[Some price calculation systems and their use in calculating soil value.]** *Medd. norske Skogforsøksv.* 12 (2), (No. 42) [1953?] (157–90). 19 refs. [Nor.nor.e.]

Gives examples of the use in calculating soil value of the 3 systems, approved by the Department of Agriculture in 1937, 1947 and 1952 and used in S.E. Norway for reckoning the prices of sawtimber and pulpwood.

2083. MILES, C. W. N. **Woodlands and estate duty.** *J. Land Agents' Soc.* 53 (12), 1954 (521–9).

Discusses the application of estate duty to woodland and the valuation of timber and woodland for this purpose.

2084. **West Coast Forestry Procedures Committee. Report No. XI. A procedure for appraisal of damage in pre-merchantable stands.** Western Forestry and Conservation Association, Portland, Ore. 1954. (89–94).

Describes and illustrates a method of valuing immature second-growth stands.

2085. HUSCH, B. **Some financial aspects of managing Black Cherry in Northwestern Pennsylvania.** *J. For.* 52 (11), 1954 (832–7). 8 refs.

Gives average volumes of the successive logs and half-logs contained in trees of 8–15 in. d.b.h. (1–4½ logs/tree); tabulates for these all possible log grades (grades 1–3, veneer and local-use logs), and their lumber yield by 5 lumber grades and veneer, assuming that (*a*) all logs in the tree have the highest log grade possible, (*b*) all have the lowest grade possible and (*c*) the first log is veneer grade, and the rest have the highest grades possible. Using 1949/50 data, the 'conversion returns' (selling price of product minus logging and milling costs) are tabulated by d.b.h. classes on the same assumptions. Using d.b.h. increment data from unmanaged stands, d.b.h. figures and the corresponding volumes and conversion returns after 10 years' further growth are estimated and given in a table along with the volume and value increment %s. Pulpwood returns are similarly analysed. The data given provide a basis for deciding which trees whould be removed in thinnings or partial cuttings. [Cf. *For. Abstr.* 15 (No. 2383).]

66. COSTING OF LOGGING OPERATIONS

See also Nos. 1801, 1814, 1826, 2082, 2090.

2086. SMEYERS, F. Quelques données économiques sur l'exploitation forestière en Ituri. **[Some economic data on conversion in Ituri.]** *Bull. Inform. Inst. nat. Étude agron. Congo belge* 3 (3), 1954 (173–8). [F.]

Detailed costing of logging and band-mill sawing in montane forest on a small scale.

67. ASSESSMENT OF FINANCIAL RESULTS; BOOK-KEEPING AND ACCOUNTANCY; BUSINESS STATISTICS; SHORT-TERM PLANNING AND FINANCING

See No. 2544.

68. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

681. *National (Federal, State) Forest Services and Administration*

2087. LOVERIDGE, E. W. **Administrative management in forestry.** *J. For.* 52 (10), 1954 (723–7). 10 refs.

The value of scientific management is illustrated from the U.S. Forest Service. The necessary work analysis consists in the definition of aims in each field, the break-down of these into component jobs, for each of which standards in quality, quantity and frequency are set and reasonably precise time requirements (especially for travelling) determined, and the grouping of these jobs into the most convenient months to get a well balanced programme. An administration plan so based will provide the most reasonable distribution of area, staff and money and give (with cost accounting) financial control also. [Cf. *For. Abstr.* 14 (No. 1462).]

7. MARKETING. ECONOMICS OF TRANSPORT AND THE WOOD INDUSTRIES

71. MARKETING OF FOREST PRODUCTS: GENERAL

2088. Holz. Rückblick, Stand, Ausblick für Industrie, Grosshandel, Einzelhandel. **[Wood. Past, present and future of the industry, and wholesale and retail trade.]** Ifo-Institut für Wirtschaftsforschung, München. 1952. pp. [2 +] 67. [G.] P.R.

The first publication of the 'Deutsches Branchenhandbuch für Industrie und Handel'. Analyses the trends in West-German sawmill and wood conversion industries, wood products, and furniture industry and trade.

2089. **Present and potential markets for Caribbean agricultural and forestry processed products.** *Carib. econ. Rev.* 5 (1/2), 1953 (59–108).

A review based on papers given at the Fifth session of the West Indian Conference, 1952.

72. THE QUANTITATIVE ASPECTS OF MARKETING. DEMAND, CONSUMPTION AND SUPPLY

See also Nos. 1771, 1808, 2105, 2424, 2427, 2481, 2543.

2090. HOWE, R. W. **Growing demand for Okoumé.** *Timb. Tr. J.* 211 (4085), 1954 (83–7).

Data are given on exports by destinations, cost of and freight on logs, production by grades, extraction costs analysis, and notes on skidding, floating, roads, tramways, extraction route and enumeration surveys, these latter including stereoscopic air photography in Jan.–Feb., when the leaves of Okoumé turn red. The subdivision of the exportation zones is detailed and future prospects reviewed.

2091. **Yearbook of forest products statistics 1954.** FAO, Rome. 1954. pp. 153. [E.F.Span.]

Contains new information for 1953 and revised data for 1952, for more than 100 countries.

2092. **Trends in economic sectors: Timber industry in Europe.** Organisation for European Economic Co-operation, Paris. 1954. pp. 108.

Contains the following chapters: (1) Structural elements (the structure of consumption, production, trade, and prices). (2) Timber market trends in 1953. (3) The market in 1954. (4) Long-term problems and expansion. (5) Summary and conclusions. With 4 appendixes (including tropical timber) and statistics for the years 1947–53.

2093. **America's demand for wood—1929–1975. A report by Stanford Research Institute, Stanford, California.** *J. For. Prod. Res. Soc.* 4 (5), 1954 (181–95).

2094. **What's ahead for wood.** *Lumberm.* 81 (11), 1954 (57–60).

Summarizes a report, sponsored by Weyerhaeuser Timber Company and prepared by Stanford Research Institute on estimated production and consumption of lumber, plywood and veneer, hardboard, pulpwood and other wood products in the U.S.A. in 1952–75.

2095. MAY, R. H. **Output of forest products in California, 1952.** *For. Surv. Release Calif. For. Range Exp. Sta.* No. 23, 1954. pp. 10.

2096. FORS, A. J. Muestrario de maderas del Ministerio de Agricultura. **[The wood specimen library of the Ministry of Agriculture [Havana].]** *Rev. agric., Habana* 37 (1), 1953/54 (105–8). [Span.] E.M.B.

Notes on the Cuban collection, which is held at the Forestry School, with comments on Cuba's timber production and trade. In 1946, 30% of Cuba's timber consumption was imported, in 1952, 72%. A list of imported species and products is given. The problem of afforestation and the rehabilitation of existing forests is of the utmost urgency.

73. PRICES

See also Nos. 2082, 2106.

2097. NOMURA, I. **[Theoretical studies on the formation of forest products prices.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 72, 1954. pp. ii + 128. Many refs. [Jap.e.]

A detailed discussion of the factors determining price in varying economic circumtances and of the cause of violent fluctuations in the price of forest products, and the desirability and practicability of a remedy. *From author's summary.*

2098. BEAZLEY, R. I. **Lumber prices in relation to the construction of hardwood quality indices.** *Abstr. of thesis*, in *Dissert. Abstr.* 14 (10), 1954 (1483–4). [Purdue University.] O.R.S.

The quality index [cf. *For. Abstr.* 15 (No. 4306)] of standing timber or logs consists of 2 parts, the % grade yield of lumber and the relative price of each lumber grade, here expressed in terms of the price of No. 1 common. The study is an attempt to find how price information can be simplified for use as price relatives (p.r.'s) by discovering the varying degree of similarity among p.r.'s on the basis of grade and species among and within the several markets of the U.S.A. and the effect of time on them. Time (excluding periods of economic upheaval) caused no important variation in p.r.'s and any normal 5-year span could be used. P.r.'s of individual species within markets or of a given species between markets tended to be statistically different from each other. P.r.'s were found to vary directly with the average price level of the grade concerned. Conversion of individual p.r.'s as between markets or between species was found to be impractical.

74. TRADE POLICY

2099. CROW, G. B. **T.D.A.—What it is and what it does.** *Timb. Tr. J.* 211 (4079), 1954 (1149–50, 1164).

States that of the £85,000 income, 25% is spent on publicity, 15% on design and testing, 5% on biological work, 15% on regional and 35% on general overheads.

75. TRADE CUSTOMS AND USAGES

2100. **Set clauses registered by the A.T.I.B.T. for the formulating of FOB and CAF contracts.** Centre Technique Forestier Tropical, Nogent-sur-Marne. 1954. pp. 13. [E.]

Cf. *For. Abstr.* 16 (No. 819).

2101. **Special clauses for CIF contract.** Centre Technique Forestier Tropical, Nogent-sur-Marne. 1954. pp. 3. [E.]

78. ECONOMICS OF TRANSPORT

See also No. 2090.

2102. ORAM, R. B. **The modern port—III. The Surrey Commercial Docks.** *P.L.A. Monthly, London* No. 349, 1954 (227–30). (Also, in abridged form, in *Timb. Tr. J.* 211 (4079), 1954 (1161–3).)

Gives the history, lay-out (map), mode of working and recent development in the 12 docks [of the largest timber-receiving system in the U.K.] which comprise 134 acres of water and 9 miles of quay, exclusive of 7 miles along the Grand Surrey Canal. Before the 1940 air raids there was covered storage for 80,000

std. of softwood but in 1952 what remained or had been reconstructed was space for only 24,000 std.

79. ECONOMICS OF THE WOOD INDUSTRIES

See also Nos. 2086, 2094–5, 2318, 2405, 2424–8, 2451, 2481, 2524.

2103. **The agricultural and forestry bases of industrial development in the Caribbean.** *Carib. econ. Rev.* 5 (1/2), 1953 (20–58).

Includes short notes on production and supply of timber and on the timber industries in the Caribbean, and discusses possibilities of expansion. The review is based on papers given at the Fifth Session of the West Indian Conference, 1952.

8. FOREST PRODUCTS AND THEIR UTILIZATION

See also Nos. 1339, 1798, 2543, 2576.

2104. TACK, C. H. **Timber utilization in Uganda.** *Emp. For. Rev.* 33 (3), 1954 (256–61 + 4 photos). 3 refs.

A short account of the recently established Utilization Branch and the principal lines of research to be pursued.

2105. **Softwood and the main consuming industries, a critical survey.** *Wood* 19 (12), 1954 (489–503).

Contains the following papers: Grading of softwood (*G. V. Donnelly*); Softwood in building (*R. T. Walters*); Joinery design (*F. MacManus*); Data sheet of common commercial softwoods (*B. A. Jay*); The box and packing case trade (*J. A. Taylor*); and The future of homegrown softwoods (*A. Watt*).

2106. MAYER-WEGELIN, H. Produktion und Verwertung der Rotbuche. **[Production and utilization of Beech wood (*Fagus sylvatica*).]** *Holz-Zbl.* 80 (123), 1954 (1431–3). [G.]

A lecture delivered at a meeting of Swiss, German and Austrian wood specialists in Lucerne, Sept. 1954, outling the history of Beech utilization in Central Europe (mainly Germany) since ca. 1850. Since 1870, steady progress has been made in the rational utilization of Beech timber, e.g. during the last 70 years, the % of Beech sleepers installed in German railways rose from nil to ca. 60% of the total number of sleepers. A similar development is noted in the manufacture of rotary Beech veneers. Diagrams are presented to show: (1) values for Beech, Oak and Larch in the author's 'hardness feeler' test; (2) effect of site and age class on the density of Beech; (3) relationships between growth-ring width and density, heartwood diam. and age, and red heartwood and tree height (the last two for *Fagus orientalis*); (4) utilization (as timber, sleeper material, and peeler logs) of different portions of the stem; and (5) graphs for determining the value of Beech stems and logs.

81. WOOD AND BARK: STRUCTURE AND PROPERTIES

810. *General Information on Woods*

See also Nos. 1451, 1475, 1492–5, 2262.

2107. Nomenclature des bois tropicaux. I. Afrique. **[Nomenclature of tropical woods. I. Africa.]** Association Technique Internationale des Bois Tropicaux, Nogent-sur-Marne. 1954. pp. 82. [F.E.G.Span.]

Consists of: (1) explanatory notes in 4 languages; (2) index of scientific names; (3) index of native names; (4) table of principal African species (*a*) currently exported, (*b*) used locally, giving trade and scientific names, provenance, annual production by countries, mean log weight, sp. gr. at 15% moisture content, mean diameter, merchantable length, colour, other visible characters, utilization, and literature references; (5) a short bibliography.

2108. **Interim standard nomenclature for commercial timbers imported into Australia.** *Inter. Specif. Stand. Ass. Aust.* No. *SAA Int.* 363, 1954. pp. 35. Price 10*s.* 6*d.* P.R.

Contains an alphabetical list of 186 standard trade common names (with botanical names and sources of supply), and an alphabetical index of all names listed.

2109. **Specimen woods Nos. 226–8.** *Suppls.* to *Wood* 19 (10–12), 1954. Each pp. 2.

Cape Beech (*Rapanea melanophleos*); Danta (*Cistanthera papaverifera*); and Sepetir (*Sindora* sp.).

2110. SCHUSTER, K. Holzgewinnung auf den Andamanen. **[Timber extraction on the Andaman islands.]** *Holz-Zbl.* 80 (143), 1954 (1681–2). [G.]

Describes the main, and lists other, forest species extracted in the Andamans for timber. [Cf. *For. Abstr.* 15 (No. 3993).]

2111. DESCH, H. E. **Manual of Malayan timbers. Vol. 2.** *Malay. For. Rec.* No. 15, 1954 (329–762 + 58 plates). 308 refs. Price S.$15·00.

This volume concludes the work, containing dicotyledonous families Melastomaceae-Winteraceae (arranged alphabetically) and Coniferae, together with literature references and indexes to both volumes. [For Vol. 1 see *For. Abstr.* 8 (No. 1786).]

2112. **Trees and timbers of Sarawak and Brunei.** *Leafl. For. Dep. Sarawak* Nos. 43–45 and Index, [1954].

(43) *Elaeocarpus* spp., *Pentace macrophylla*, *Trichospermum kurzii*, and an unidentified species of Magnoliaceae (pp. 5).

(44) *Hopea* spp. (*H. nutans*, *H. pachycarpa*, *H. pentanervia* and *H. laxa* have been identified) (pp. 4).

(45) *Ixonanthes reticulata*, *Hernandia ovigera*, *Ilex cymosa* (pp. 4).

The index includes vernacular and scientific names, uses of timbers, and minor forest products and their uses (pp. 17).

[Cf. *For. Abstr.* 14 (No. 3674); 15 (Nos. 599, 1715, 2797, 3995); 16 (No. 831).]

2113. **Timbers of East Africa.** Flatau, Dick & Co., London. 1954. pp. 57. P.R.

Contains the following information on 32 woods arranged in alphabetical order of their commercial names: botanical and other names, distribution, tree, timber, seasoning, strength, durability, working qualities and uses. An extract from the Kenya grading rules, and an alphabetical index of all names used are appended.

2114. FERREIRINHA, M. P. Madeiras de Moçambique da colecção do Laboratório de Anatomia e Tecnologia da Junta de Investigações do Ultramar. **[Timbers of Mozambique from the collection in the wood anatomy and technology laboratory of the Junta de Investigaçoes do Ultramar.]** *Garcia de Orta, Lisboa* 2 (2), 1954 (227–30 + 12 plates). [Port.]

A series of life-size reproductions in colour, representing the woods of the following 12 species: *Pterocarpus angolensis, Millettia stuhlmannii, Dalbergia melanoxylon, Brachystegia spiciformis, Albizzia adianthifolia, A. versicolor, Diospyros mespiliformis, Chlorophora excelsa, Erythrophleum guineense, Khaya* sp., *Bombax rhodognaphalon, Burkea africana*, with brief notes on each wood and its properties. [Cf. *For. Abstr.* 15 (No. 3992); 16 (No. 830).]

2115. **Properties of Australian timbers.** *For. Prod. News Lett. C.S.I.R.O. Aust.* Nos. 197–198, 1954 (8; 8).

(*a*) King William Pine (*Athrotaxis selaginoides*); (*b*) Southern Sassafras (*Atherosperma moschatum*).

2116. **Timbers of New South Wales.** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 7 (3; 4), 1953 (3–7; 3–8).

(*a*) Tallowwood (*Eucalyptus microcorys*); (*b*) White Cypress Pine (*Callitris glauca*) and Black Cypress Pine (*C. calcarata*).

2117. BETTS, H. S. **[American woods.]** *Amer. Woods U.S. For. Serv.* (Rev.) 1954.

(*a*) Western White Pine (*Pinus monticola*) (pp. 6; 11 refs.); (*b*) Eastern White Pine (*P. strobus*) (pp. 8; 10 refs.); (*c*) Ponderosa Pine (*P. ponderosa*) (pp. 8; 18 refs.); (*d*) Yellow Poplar (*Liriodendron tulipifera*) (pp. 8; 10 refs.); (*e*) the Southern Pines (*P. palustris, P. elliottii, P. echinata* and *P. taeda*) (pp. 13; 11 refs.).

2118. GERRY, E. **Information leaflet. Foreign woods. Klinki, Rassu, Pai. *Araucaria klinkii* Lauterbach.** *Rep. U.S. For. Prod. Lab., Madison* No. 1987, 1954. pp. 12 + 2 photos + 1 dgm. + 1 gph. + 3 tbls. 18 refs. P.R.

2119. GERRY, E. **Information leaflet. Foreign woods. Alerce. *Fitzroya cupressoides* (Molina) Johnston (= *F. patagonica* J. D. Hooker).** *Rep. U.S. For. Prod. Lab., Madison* No. 1982, 1954. pp. 7 + 1 tbl. 21 refs. P.R.

2120. **[Japanese woods: *Chamaecyparis pisifera.*]** *Suppl.* to *Wood Ind., Tokyo* 9 (11), 1954. pp. 2. [Jap.] P.R.

Includes photomicrographs and tabulated data on properties.

2121. PERRY, R. S. **Yellow Cedar [*Chamaecyparis nootkatensis*]: its characteristics, properties, and uses.** *Bull. For. Br. Can.* No. 114, 1954. pp. 19. 7 refs.

2122. **Properties of thinnings of home-grown Sitka Spruce (*Picea sitchensis*). Progress report 3—Consignment No. 782. Progress report 4—Consignment No. 792.** Forest Products Research Laboratory, Princes Risborough. 1954. Each pp. 12 + 10 photos.

(1) Consignment No. 782 from Drumtochty Forest, Auchenblae, Kincardineshire, was fast-grown and of low density and tended to collapse before and during seasoning. Logs had considerable taper and were very knotty. The timber was mainly (91%) grade III and only suitable for crates and temporary work where strength is not important. (2) Consignment No. 792 from Eggesford Forest, Devon, was rather faster grown than No. 782 with a considerably higher sp. gr. (0·365 compared with 0·311) and greater strength. Cup and twist were frequent in seasoning but collapse was not serious. Working qualities were poor. About half the timber was grade II, and could be used for construction, the remaining, grade III, material could be used for box and packing case making, cement-framing boards and other rough work.

2123. **Properties of thinnings of home-grown Sitka Spruce (*Picea sitchensis*). Progress report 5. Consignment No. 803.** Forest Products Research Laboratory, Princes Risborough. 1954. pp. 16.

The material examined (44 trees, 32 years old) was from Gwydyr Forest, Bettws y Coed, Caernarvonshire. It was fast-grown, averaging 4·59 rings/in. with an average sp. gr. of 0·339, below that of material from Devonshire but above that of materia from Scotland. Working properties were similar to those of previous consignments [cf. *For. Abstr.* 15 (No. 2810)]. Twist was the worst seasoning defect, cup was not excessive, and collapse was slight. Resin ducts opened appreciably during the run. Over 60% came into grade III and could be used only where strength and finish are unimportant. The remaining, grade II, material is suitable for construction.

2124. GERRY, E. **Information leaflet. Foreign woods. Sen or Sem, Harigiri, 'Castor Arabia', 'Japanese Ash', *Kalopanax ricinifolium* Miq.** *Rep. U.S. For. Prod. Lab., Madison* No. 1979, 1954. pp. 3. 3 refs. P.R.

2125. KRYN, J. M. **Information leaflet. Foreign woods. Roble blanco, Amapa, Mayflower. *Tabebuia pentaphylla* (L.) Hemsl.** *Rep. U.S. For. Prod. Lab., Madison* No. 1980, 1954. pp. 7 + 2 tbls. 33 refs. P.R.

2126. Abale. **[*Combretodendron africanum.*]** *Bois For. Trop.* No. 37, 1954 (27–30). [F.]

2127. GERRY, E., and KRYN, J. M. **Information leaflet. Foreign woods. *Eschweilera longipes* (Poit.) Miers, *Eschweilera subglandulosa* (Steud.) Miers.** *Rep. U.S. For. Prod. Lab., Madison* No. 1960 (rev.) 1954. pp. 6 + 2 tbls. 13 refs. P.R.

2128. GERRY, E. **Information leaflet. Foreign woods. Conacaste or Guanacaste. *Enterolobium cyclocarpum* (Jacq.) Gris.** *Rep. U.S. For. Prod. Lab., Madison* No. 1985, 1954. pp. 4. 7 refs. P.R

2129. GERRY, E. **Information leaflet. Foreign woods. Kokrodua. *Afrormosia* spp.** *Rep. U.S. For. Prod. Lab., Madison* No. 1978, 1954. pp. 5. 10 refs. P.R.

2130. GERRY, E., and KRYN, J. M. **Information leaflet. Foreign woods. Crabwood, Cedro macho, Carapa, *Carapa guianensis* Aubl., *Carapa procera* and other *Carapa* species.** *Rep. U.S. For. Prod. Lab., Madison* No. 1991, 1954. pp. 11 + 2 tbls. 33 refs. P.R.

2131. Monographie de Azobé (*Lophira procera* A. Chev.). **[Monograph on *L. procera*.]** *Publ. Centre tech. for. trop.* No. 7, 1954. pp. 80. 22 refs. [F.]

Botanical and silvicultural characters, silviculture, timber properties, working qualities, utilization, and trade.

811. *Structure, Identification*

See also No. 2096.

2132. METCALFE, C. R. **An anatomist's views on angiosperm classification.** *Kew Bull.* 1954 (3), (427–40). 9 refs.

A broad review dealing with the use of anatomical features, especially of the xylem, as an aid in the solution of problems of phylogeny and taxonomy, with a concluding note on the possibilities of microchemical studies in the same connexion.

2133. CAVACO, A. A anatomia do lenho e a identificação de madeiras. **[Wood anatomy and the identification of timbers.]** *Portug. Acta biol.* 4*B* (3/4), 1954 (253–317 + 2 plates). 24 refs. [Port.] O.B.D.

(1) An exposition of the principal anatomical and physical characteristics used in identifying timbers; (2) their application to the study of African timbers; (3) notes on some timbers of Portuguese Africa, grouped according to their uses; (4) the work of the wood structure laboratory; (5) the identification of timbers from macroscopic characters, listing the features of some West African species; and (6) the preparation of specimens for study under the microscope.

2134. TRENAMAN, K. W. **A lens key to some Uganda timbers.** *Tech. Note For. Dep. Uganda* No. 14/54, 1954. pp. 24. 1 ref.

Covers over 100 Uganda species, about half of which are also West African. The species are also listed with their standard features numbered for the making of a punched card key.

2135. URLING, G. P., and SMITH, R. B. **An anatomical study of 20 lesser known woods of Florida.** *Quarterly Journal of the Florida Academy of Sciences, Gainsville* 16 (3), 1953 (163–80). 7 refs. L.S.

2136. BASCOPÉ V., F. Estudios estructurales de ciertas maderas de los bosques del valle de la Mucuy, cerca de Mérida. **[The structure of some timbers from the Mucuy valley, near Mérida.]** *Bol. Ingen. for. Univ. Los Andes* 1 (3; 4), 1954 (20–6; 11–8). 12 refs. [Span.]

A study of the wood structure of the following species *Montanoa quadrangularis, Myrcia acuminata, Beilschmiedia* sp. nov., *Hedyosmum glabratum, Tetrorchidium rubrivenium, Miconia* sp. (?), *Turpinia heterophylla, Cinchona pubescens, Laplacea fruticosa* and *Solanum* sp. The study is preceded by a definition of terms.

2137. JAMES, C. F. **Sub-project W.S. 11–0. The anatomy of the timbers of the South-west Pacific area—miscellaneous investigations. Experiment No. 1—The wood anatomy of timbers found in Mangrove associations of the south-west Pacific area. First report.** Division of Forest Products, C.S.I.R.O., Melbourne. 1954. pp. 61 + 6 plates. 28 refs.

The macroscopic and microscopic features of 17 timber-producing genera found in Mangrove associations are described, including, where possible, details of anatomical distinctions between species. Two keys, one using macroscopic features only, and one with macroscopic and microscopic features, have been prepared to assist in the identification of the genera. *From author's summary.*

2138. JANE, F. W. **The structure of timbers of the world—1–26.** *Timber News* 59, 1951 (186–7; 240–1; 328–30; 386–8; 484–7; 536–8); 60, 1952 (24–7; 78–80; 131–3; 183–5; 277–80; 332–4; 429–31; 529–32; 579–82); 61, 1953 (19–21; 109–11, 115; 157–9; 323–5; 537–9); 62, 1954 (15–7; 67–9; 173–5; 225–7; 437–9; 493–5).

The timbers so far described in this series are:— *Terminalia superba, T. ivorensis, Phoebe porosa, Endiandra palmerstonii, Mansonia altissima, Lovoa klaineana, L. brownii, Antiaris africana, Turraeanthus vignei, T. africana, Sequoia sempervirens, Taxodium distichum, Cryptomeria japonica, Distemonanthus benthamianus, Afrormosia elata, Piptadenia africana, P. rigida, Ocotea rodiaei, Lophira alata* var. *procera, Syncarpia laurifolia, Tristania conferta, Liriodendron tulipifera, Cercidiphyllum japonicum, Magnolia denudata, Laurelia aromatica, Cordia alliodora, Aextoxicon punctatum, Grevillea robusta, Knightia excelsa, Cardwellia sublimis, Ilex aquifolium, Robinia pseudoacacia, Ailanthus altissima, Dysoxylum fraseranum, Sandoricum indicum, Carapa guianensis, Tsuga heterophylla, T. canadensis, Cedrus deodara, C. libani, Chamaecyparis nootkatensis, Entandrophragma cylindricum, E. candollei, E. angolense, E. utile, Pycnanthus kombo, Mimusops heckelii, Tarrietia utilis, Dacrydium colensoi, Callitris glauca, Agathis australis, Aucoumea klaineana, Canarium schweinfurthii, C. euphyllum, Pterocarpus angolensis, Maesopsis eminii, Ocotea usambarensis, Intsia bakeri, Dipterocarpus tuberculatus, Dryobalanops oblongifolia, D. keithii, Ricinodendron rautanenii, Croton megalocarpus, Hieronyma alchorneoides, Hura crepitans, Juniperus virginiana, Libocedrus decurrens, Chamaecyparis lawsoniana, C. thyoides, Alnus glutinosa, Carpinus betulus, Corylus maxima, Drimys winteri, Gnetum gnemon, Gonystylus bancanus, Tetramerista glabra, Steganthus welwitschii, Brachylaena hutchinsii.*

2139. JOHNSTON, D. R. **Structure drawings to 'Specimen woods' Sheets 40–42.** *Wood* 19 (10–12), 1954. (410; 449; 488).

(10) Muputu (*Brachystegia spiciformis*), Mjombo (*B. boehmii*), Sitka Spruce (*Picea sitchensis*), and Morabukea (*Mora gonggrijpii*).

(11) Mchenga (*Isoberlinia globiflora*), Mubura (*Parinari excelsa*), Chilean Pine (*Araucaria araucana*), and Muhimbi (*Cynometra alexandri*).

(12) Yellow Sterculia (*S. oblonga*), Nyankom (*Tarrietia utilis*), Celtis (*C. soyauxii*), and Poon (*Calophyllum tomentosum*).

2140. Greguss, P. Xylotomische Bestimmung der Taxodiaceen. **[Determination of the Taxodiaceae by wood anatomy.]** *Repr.* from *Annales Biologicae Universitatum Hungariae* 2, 1952 (407–16). 35 refs. [G.hu.russ.] X.

Analyses the wood anatomy of the existing genera and suggests tentative criteria for the identification of genera and species. Concludes that the Pinaceae stand nearest to the Taxodiaceae; some common features are also found with Cupressaceae; but other families (Taxaceae, Cephalotaxaceae, Araucariaceae and Podocarpaceae) differ very distinctly.

2141. Kaeiser, M. **Microstructure of wood of *Podocarpus*.** *Phytomorphology* 4 (1/2), 1954 (39–47). 18 refs. O.B.D.

Observations on microstructural features of wood of 74 species of *Podocarpus* and their taxonomic significance.

2142. Morrison, T. M. **Comparative histology of secondary xylem in buried and exposed roots of dicotyledonous trees.** *Phytomorphology* 3 (4), 1953 (427–30). 13 refs. O.B.D.

Discusses and sets forth in table form data gathered from 6 New Zealand species: *Carpodetus serratus*, *Fuchsia excorticata*, *Griselinia littoralis*, *Melicytus ramiflorus*, *Nothopanax colensoi* and *Pseudopanax crassifolium*.

2143. Stern, W. L. **Comparative anatomy of xylem and phylogeny of Lauraceae.** *Trop. Woods* No. 100, 1954 (1–73 + 19 photos). 130 refs.

Places the Lauraceae, on similarity in wood anatomy, with Annonaceae, Berberidaceae, Calycanthaceae, Lactoridaceae, Chloranthaceae and Magnoliaceae, the first showing more advanced features, and the last two, less specialized xylem. Similarities in the wood of Hernandiaceae, Monimiaceae, Myristicaceae and Lauraceae suggest for these a common ancestry, the Nutmegs (which differ largely in other respects) branching off early. The Lauraceae and close relatives appear to be a terminal group derived from Magnolialian forbears. They should not be included in a taxon of primitive dicotyledons. *From author's summary.*

2144. Li, H.-L., and Chao, C.-Y. **Comparative anatomy of the woods of the Cornaceae and allies.** *Quart. J. Taiwan Mus.* 7 (1/2), 1954 (119–36 + 72 photos). 24 refs. [E.e.]

Describes the timbers of Garryaceae, Nyssaceae, Cornaceae, Helwingiaceae, Alangiaceae and Torricelliaceae and includes photomicrographs of transverse, radial and tangential sections of 24 species.

2145. Dadswell, H. E., and Ingle, H. D. **The wood anatomy of the New Guinea *Nothofagus* Bl.** *Repr.* from *Aust. J. Bot.* 2 (2), 1954 (141–53 + 3 plates). 14 refs. (*Repr. For. Prod. Aust.* No. 213).

On the basis of wood anatomy the genus can readily be separated into 2 distinct groups, one comprising the New Guinea species (8 examined), and the other the temperate species from South America, New Zealand and eastern Australia (14 examined). The New Guinea species are characterized by larger, less numerous vessels, distinct bands of parenchyma, and the absence of tracheids. The results support the segregation of the New Guinea species into a separate subsection of the genus. [Cf. *For. Abstr.* 15 (No. 1140).]

2146. Špoljarić, Z. Anatomska građa drva tilovine. **[Wood structure of *Petteria ramentacea*.]** *Glasn. šumske Pokuse* 11, 1953 (311–20 + 6 photos). 8 refs. [Croat.e.]

An account of the general properties and macro- and microscopic features of the wood.

811.1. Anatomical Elements and Tissues

See also Nos. 1917–8, 2175, 2189–91, 2213, 2374, 2404, 2431.

2147. Eicke, R. Beitrag zur Frage des Hoftüpfelbaues der Koniferen. **[The structure of bordered pits in conifers.]** *Ber. dtsch. bot. Ges.* 67 (6/7), 1954 (213–7 + 2 plates). 7 refs. [G.] O.B.D.

Presents observations on the structure of the primary cell wall of bordered pits. No evidence could be found of a membrane joining the threads as observed by Liese. [Cf. *For. Abstr.* 15 (No. 1734).]

2148. Liese, W., and Johann, I. Elektronenmikroskopische Beobachtungen über eine besondere Feinstruktur der verholzten Zellwand bei einigen Coniferen. **[Electron-microscope observations on a particular feature of the fine structure of the lignified cell wall in some conifers.]** *Planta* 44 (3), 1954 (269–85). 21 refs. [G.g.] O.B.D.

Small warty excrescences were observed on the internal wall of longitudinal tracheids and also on the walls of bordered pits in *Pinus sylvestris*, and appear to be an integral part of the wall. Their size and frequency vary widely. The layer which carries them can easily be separated from the other cell-wall layers, where no excrescences are found. This structure is therefore characteristic only of the 'internal layer' of the secondary wall, for which the name 'tertiary wall' is suggested. In 39 other species examined some Pines possessed them, others did not; they were present in all Firs examined, but absent in Spruce and Larch. [Cf. *For. Abstr.* 15 (No. 4017).]

2149. Preston, R. D., and Ripley, G. W. **An electron-microscopic investigation of the walls of conifer cambium.** *J. exp. Bot.* 5 (15), 1954 (410–3 + 2 plates). 12 refs. O.B.D.

The primary walls of conifer cambium appear to have the type of structure already found in other primary walls, except that no area of 'loose' microfibrils seems to be present. In addition, groups of fibrils are visible radiating from a centre which appears to be granular, strongly recalling the putative islands of synthesis reported in *Valonia*. *From authors' summary.*

2150. WARDROP, A. B. **Observations on crossed lamellar structures in the cell walls of higher plants.** *Repr.* from *Aust. J. Bot.* 2 (2), 1954 (154–64 + 12 plates). 35 refs. (*Repr. For. Prod. Aust.* No. 210).

Crossed lamellar structure was present in the phloem fibres of *Vinca major* and the tracheidal elements of the aerial root of *Alstonia spathulata*. In the outer layer of the secondary wall of wood fibres of *Eucalyptus elaeophora* and *E. regnans* there is inconclusive evidence of a crossed structure similar to that observed in the cell walls of some vessels, consisting of a loosely formed mesh of aggregated microfibrils. This structure is considered to be distinct from the crossed lamellar and cross-banded structures. *From author's summary.*

2151. WARDROP, A. B. **The mechanism of surface growth involved in the differentiation of fibres and tracheids.** *Repr.* from *Aust. J. Bot.* 2 (2), 1954 (165–75 + 9 plates). 34 refs. (*Repr. For. Prod. Aust.* No. 215).

An electron-microscopic investigation has been made of the differentiating xylem elements of *Pinus radiata*, *Eucalyptus elaeophora*, and *Ulmus* sp. In the tips of fibres and tracheids there is a tendency for the microfibrils of cellulose to be oriented in the direction of growth. It is considered that this orientation can be disturbed by subsequent dimensional changes in the cell. The thin areas of the differentiating cells which are involved in the so-called 'mosaic growth' have been compared with the regions of the cell wall penetrated by plasmodesmata in the storage parenchyma of potato tubers. The suggestion is made that the thin areas are regions of the cell wall penetrated by plasmodesmata, or are developing primary pit fields. The implications of this concept, with respect to intercellular readjustment and to the differences between fibres and tracheids in extension growth, are discussed. *Author's summary.*

2152. SPURR, S. H., and HYVÄRINEN, M. J. **Wood fiber length as related to position in tree and growth.** *Bot. Rev.* 20 (9), 1954 (561–75). 52 refs. [School of Natural Resources, Univ. of Michigan.]

A review and discussion of selected literature, with emphasis on data rather than the conclusions previously drawn. The word fibre is used in the broad sense, including the tracheids of gymnosperms.

2153. KUZIEL, S. Recherches sur la longueur de fibres du bois. [**Length of wood fibres.**] *Repr.* from *Bulletin de la Société des Sciences et des Lettres de Lodz, Classe III de Sciences mathématiques et naturelles* 4 (13), 1953. pp. 2. [F.] P.R.

Measurements of fibre length, in the early (e.w.) and late wood (l.w.) of 6–8 growth rings in disks taken at a height of 4·3 m. from (1) *Populus alba*, (2) *P. canescens*, (3) *P. tremula* and (4) *P. deltoides*, age 21–30 years, totalling 6600 measurements, showed that l.w. fibres were in all cases longer (by $\frac{1}{5}$–$\frac{1}{3}$) than those in e.w.; the mean fibre length increased in passing from e.w. to l.w. in the same growth ring, and also with increasing distance from the centre; it decreased in the following order of species: (4), (1), (3), (2). Fibres were shorter in wide, and longer in narrow, growth rings.

2154. MESSERI, A. Caratteri dimensionali e strutturali delle fibre di tensione di un campione di pioppo (*Populus euramericana* Guinier, cv. clone 214). [**Dimensions and structures of fibres in tension wood from a sample of *P.* '*euramericana*' clone 214.**] *Cellulosa e Carta, Roma* 5 (8), 1954 (8–10). 6 refs. [It.]

The sample studied was from the 4th annual ring of a tree 10–12 years old. The fibres were isolated by treatment in 5% H_2CrO_4 at normal temperature. Many fibres broke during treatment, those from normal wood breaking with a clean fracture, those from tension wood with a very irregular fracture. The shape of the tension-wood fibres was less definite than that of normal wood, with a needle-shaped body and no clear distinction between the apex and the rest of the fibre. The pits in the cell wall, which are slit-like in normal wood, were round in the tension wood. In the lumen there were folds in the inner layer of the secondary wood, due to its greater perimeter in relation to the outer membrane. The lengths and mean widths of the two types of fibre (normal and tension wood) were calculated from 500 fibres of each type, all taken from the 4th annual ring, beginning with the earliest and proceeding to the latest zone. In contrast to the data in most of the literature, the length of fibre in the tension wood (450–1050μ, average 700μ) was less than that in normal wood (500–1200μ, average 750 and 1050μ—the frequency curve having two maxima). Within the growth ring the length of fibre was much more uniform in tension wood than in normal wood, where the fibres were consistently shorter in the early than in the late wood.

Another interesting characteristic is the different longitudinal relation of the fibres. In normal wood they overlap by very variable amounts, while in tension wood the apices overlap by a shorter and more constant length. In other words, the middle lamellae, which form the network in which the fibres are contained, are differently developed, in extent and frequency, according to the differing length of the two types of fibre. This may be responsible, at least in part, for the different behaviour of normal and tension wood in respect to shrinking [cf. *For. Abstr.* 15 (No. 2830)]. The article also includes a report on data, already published elsewhere, on similar material [cf. *For. Abstr.* 15 (No. 4023)].

2155. KANTOLA, M. Selluloosan röntgendiffraktiotutkimusesta. [**X-ray diffraction investigations on cellulose.**] *Pap. ja Puu* 36 (10), 1954 (373–80). 3 refs. [Fi.e.] P.R.

Discusses the use of the method and presents diagrams for differently treated cellulose samples and for normal and tension wood of Birch. *From author's summary.*

2156. YAMAI, R. [**A mechanical model of the cell wall of compression wood.**] *Science Bulletin, Faculty of Agriculture, Kyushu University* 13 (1/4), 1951 (234–7). L.S.

Results of experiments on the relation between the angle of fibrillar orientation and longitudinal strain, as determined on a model tracheid. *From author's summary.*

811.2. Special Features and Abnormal Structure

See also Nos. 2154–6, 2212.

2157. SPURR, S. H., and HYVÄRINEN, M. J. **Compression wood in conifers as a morphogenetic phenomenon.** *Bot. Rev.* 20 (9), 1954 (551–60). 68 refs. [School of Natural Resources, Univ. of Michigan.]

A review of world literature, under the heads: occurrence; properties and function; and governing factors.

811.4. Growth Rings. Early and Late Wood

See also Nos. 2153–4, 2163, 2185, 2213.

2158. PAUL, B. H., and MARTS, R. O. **Controlling the proportion of summerwood in Longleaf Pine.** *Rep. U.S. For. Prod. Lab., Madison* No. 1988, 1954. pp. 6 + 1 photo + 1 gph. + 2 tbls. 4 refs. P.R.

(A revision of an article published in *J. For.* 29 (5), 1931.) A fairly close correlation was found (1927–29) to exist between the current soil water supply and latewood (l.w.) formation in *Pinus palustris* trees in the deep, sandy soils of the Choctawhatchee National Forest. There was distinct evidence that water regularly supplied throughout the growing season greatly increased the relative proportion of l.w. in the growth rings. A complete fertilizer, without artificial irrigation, seemed to increase diameter growth slightly, more so in the early wood than in l.w.; a nitrate fertilizer increased the l.w. to a greater degree.

2159. BENIĆ, R. Istraživanja o odnosu između širine goda i zone kasnog drveta kod poljskog i običnog jasena. **[Investigation on the relationship between width and proportion of late wood in *Fraxinus angustifolia* and *F. excelsior*.]** *Glasn. šumske Pokuse* 11, 1953 (53–72). 11 refs. [Croat.croat.e.]

The ring width of *F. angustifolia* in the stand studied (near Lipovljani) varied from 0·4 to 5·9 mm. (mean 2·05 mm.). The corresponding figures for *F. excelsior* were: trees from Zagreb Mt., 0·4–4·0 (1·28), and from Risnjak Mt., 0·2–4·5 (1·34) mm. In both species, width of early wood showed no correlation with ring width, but was roughly constant (ca. 0·75 mm. for *F. angustifolia*, and ca. 0·55 and 0·35 mm. for the two *F. excelsior* stands). Width of late wood varied almost linearly with ring width, except for very narrow rings.

811.5. Sapwood and Heartwood

See also No. 2214.

2160. BENIĆ, R. Procjena učešća obojene srži u dubećem deblu poljskog jasena (*Fr. angustifolia* Vahl). **[Estimation of the proportion of brown heart in the stem of *Fraxinus angustifolia*.]** *Šum. List* 78 (8), 1954 (365–79). 11 refs. [Croat.croat.e.]

According to the author's investigations published in a doctoral thesis (Zagreb, 1953) there is a functional relationship between the cross-sectional area (S) of sapwood in *F. angustifolia* at 2·4 m. above ground and the crown volume (V), which can be expressed as $S = 14{\cdot}339 \times V^{0{\cdot}6725855}$ sq. m. for dominants on class-1 sites in the lowland forests near Lipovljani (near the Sava river). Tables and graphs present the relationships between: (1) the volume and diam. of the crown for different values of the crown depth, and (2) the % occupied by the heartwood at 2·4 m. above ground and d.b.h. for different crown volumes.

2161. KADAMBI, K. **Inducing heartwood formation in the Indian Sandalwood tree, *Santalum album*, Linn.** *Indian For.* 80 (10), 1954 (659–62 + 4 photos).

Under the conditions of soil and climate obtaining at Dehra Dun, it has been found possible to induce the formation of a distinct core of heartwood, an inch or more in diameter, in young (12-year-old) Sandal trees, by subjecting them to annually repeated injections of aqueous solutions of a growth regulator Seradix A (7½%), $ZnSO_4$ (1%) and $CuSO_4$ (1%). The same result may sometimes by achieved by boring holes through the trees, but heartwood formation is generally confined, in such cases, to the vicinity of the bore holes. Traces of heartwood formation can also be induced by wounding, e.g. root pruning, lopping, or heavy blows on the surface of the tree, which jam the superficial living tissue. These experiments are likely to be of considerable practical use in localities where formation of Sandal heartwood is poor though the tree grows luxuriantly.

2162. KRZYSIK, F. Fałszywa twardziel w świetle nowych poglądów. **[False heartwood according to recent research.]** *Sylwan* 98 (3), 1954 (153–61). 11 refs. [Pol.russ.e.]

Summarizes the ideas expounded by Černcov and Akindinov ('The nature of heart formation in Beech; physico-mechanical properties of wood', published by CNIIMOD, Moscow-Leningrad, 1953), according to which (1) heartwood formation in Beech is a normal phenomenon occurring relatively late in life, i.e. Beech is a heartwood species, and (2) there are no species without heartwood. These ideas are based on investigations of ca. 1000 tree-length and shorter logs in the Eastern Carpathians. Consequently the conventional classification of trees into: (*a*) those with discernible sapwood, non-coloured and coloured heartwood (Elm, Ash, Willow), (*b*) those with sapwood and non-coloured heartwood (Spruce, Fir, Beech, Lime), (*c*) those with coloured heartwood (Oaks, Walnut, Chestnut, Robinia) and (*d*) those with sapwood only (Hornbeam, Alder, Birch, Aspen, Horse Chestnut, Hazel), should be reduced to two groups, viz. (1) trees with coloured heartwood, and (2) trees with non-coloured heartwood.

811.7. Phloem. Bark

See Nos. 1421, 1450, 2178, 2214.

812. *Physical and Mechanical Properties*

2163. VORREITER, L. Stammform und Holzeigenschaften der Bayernwald-Fichte. **[Stem form and wood properties of the Bayernwald Spruce.]** *Holz Roh- u. Werkstoff* 12 (2), 1954 (47–54). 11 refs. [G.g.] P.R.

Tabulates the mean and weighted mean values (from large populations) of late-wood %, oven-dry

density, compression strength and bending strength of *Picea abies* from the Bayrischer Wald, obtained from two test stems. Previous results are confirmed, and some relationships expressed in the form of equations. Graphs of the stem form of the test stems are given.

2164. SOEPARDI. Beberapa tjatatan tentang djati. [**Some notes on Teak.**] *Rimba Indonesia* 3 (5/7), 1954 (280–8). [Jav.]

Includes data on 'Kapur-Teak'—a form with soft timber, of low sp. gr. and containing a high proportion of CaO—and on hardness, density, calorific value and properties for charcoal burning.

812.1. Optical, Acoustic, Frictional, Thermal and Electrical Properties

See also Nos. 2360, 2398.

2165. PTACNIK, E. Experimentelle Prüfung der inneren Reibung von Holz. [**Experimental testing of internal friction in wood.**] *Acta physica austriaca, Wien* 8 (1), 1953 (28–34). [G.g.] L.S.

An electro-acoustical set-up for determining the E modulus and the inner friction of wood is illustrated and the method of measurement described. The graphs included give the dependence of the loss factor of Spruce resonance wood (of different age) on the frequencies of longitudinal and bending oscillations, on moisture content and temperature. Resonance woods have a small internal friction at low, and a relatively high friction at high frequencies.

2166. SEEKAMP, H. Die Klassifizierung der Brennbarkeit holzhaltiger Platten. [**Classification of the combustibility of wood-containing boards.**] *Holz Roh- u. Werkstoff* 12 (5), 1954 (189–97). 4 refs. [G.g.] P.R.

The adoption is suggested of a constant value of flame operation (1 n.t.p. litre coal-gas/min./linear cm. inflamed) irrespective of board thickness, in order to establish a standard for the combustibility of materials in board form. The combustion process is followed by means of a specially designed direct-reading balance. The results of weighings are graphed, evaluation being based on Motz's weight-loss/time integral which takes into account the following factors: ignition, fire spread, rate of burning, and final loss in weight. This integral, which is represented by the area below the weight-loss/time curve, is calculated for a standard length and width of 1 m. and integrated over a 20 min. time range, yielding the 'relative degree of combustibility' independent of specimen size. The 'absolute degree of combustibility' is obtained by multiplication with the initial specimen weight. Both the relative and absolute weight losses so assessed were found to be roughly independent of board thickness, whether insulation or hard fibreboard, chipboard, plywood or solid wood.

2167. JENTZSCH, H. Neuere Untersuchungen zur Klassifizierung der Brennbarkeit von Holz. [**Recent investigations on the classification of wood combustibility.**] *Holz Roh- u. Werkstoff* 12 (5), 1954 (197–8). 1 ref. [G.] P.R.

[Cf. *For. Abstr.* 14 (No. 3707); 15 (No. 4034).]

The author has added a further characteristic for building materials, viz. the *Glühwert* (glow value), defined as contraction of a rod under a constant load, when exposed to a constant radiating heat during unit time. This characteristic is calculated from the formula $\Sigma\Delta = \Delta_5/n$, where $\Sigma\Delta$ is the sum of all contractions (in mm.); n, the number of measurements, and Δ_5, the contraction after 5 minutes. The determination of this value is conducted in the Jentzsch ignition tester, in which a basket of refractory material is substituted for the crucible. The test rod is placed vertically in the basket and loaded (0·8 kg./sq. cm. of cross-section). The temperature in the centre of the basket is maintained at a constant level [temperature value or range not stated]. The contraction is read off on a scale. Results of measurements (Δ_5 and $\Sigma\Delta/n$) and the calculated 'glow values' are tabulated for Spruce, Pine, Beech and Oak specimens of different moisture content, either untreated or treated with a fire-retardant or wood preservative, or coated with varnish. A graph shows the contraction/time curve for an untreated and a treated rod.

2168. HEARMON, R. F. S., and BURCHAM, J. N. **The dielectric properties of wood.** *Spec. Rep. For. Prod. Res., Lond.* No. 8, 1954. pp. 19. 29 refs. Price 1*s.* 6*d.*

Measurements of permittivity and loss tangent on 12 species of wood, in the 3 grain directions, at moisture contents (m.c.) up to 18%, and over the frequency range 2 kc./s to 60 Mc./s are summarized and discussed. The results for Sitka Spruce and Oak are presented in some detail. The permittivities change uniformly with m.c. and frequency; they are closely related to density, and a method is suggested which enables the permittivities of any timber to be predicted approximately in terms of density, m.c. and frequency. The variation of loss tangents with density, frequency and m.c. is less regular, and it is not possible to predict values of these quantities with any accuracy. Results of measurements on wet woods show extremely large variations in permittivity and loss tangent with frequency, but the conductivity depends much less on frequency than it does for dry wood. The dielectric behaviour of dry wood can be qualitatively described in terms of the dipole theory, but as the moisture content increases, the effect of ionic conductivity becomes more and more important. *Authors' summary.*

2169. KRÖNER, K., and PUNGS, L. **The behaviour of the dielectric loss factor of natural wood in the high frequency range.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2267, 1954. pp. 14 + 5 gphs. 26 refs. Transl. by H. E. Kijlstra from *Holzforschung, Berlin* 7 (1), 1953 (12–8). [See *For. Abstr.* 15 (No. 646).] Limited distribution. P.R.

812.2. Behaviour with Liquids and Gases. Moisture Relations etc.

See also Nos. 2154, 2185, 2336–40, 2349, 2359, 2374, 2402–4.

2170. MOLL, F. **Wood and water: a contribution to the hygroscopic equilibrium between wood and**

water. *Transl. For. Prod. Aust.* [*n.d.*]. pp.2. Condensed transl. by W. G. Kauman from *Holztechnik* 28 (10), 1948 (204). Limited distribution. P.R.

2171. James, W. L. **News and views of this kiln drying business. The problem: Do resistance-type meters correctly indicate the moisture content of wood treated with a water-repellent preservative containing pentachlorophenol?** *Rep. U.S. For. Prod. Lab., Madison* No. 1769–15, 1954. pp. 2. P.R.

Comparative tests of both treated and untreated specimens indicate that resistance-type moisture meters can be used without correction for lumber that has been treated with a preservative solution containing a water repellent and 5% of pentachlorophenol, if the actual m.c. of the lumber is $< 15\%$; for higher m.c. values, 1% should be subtracted from the m.c. indicated by the meter.

2172. Cokley, K. V., Adkins, B. L., and Rees, E. J. **Project Q.C. 8. Investigations into the manufacture of plywood. Report No. 1 on the determination of moisture content in rotary cut veneers by hygrometric methods.** Queensland Forest Service, Brisbane. 1953. pp. 11 + 1 tbl. 1 ref. P.R.

A definite relationship was found to exist between the moisture content of $\frac{1}{16}$-in. veneers of Hoop Pine [*Araucaria cunninghamii*], Brown Tulip Oak [*Tarrietia argyrodendron*] and Yellow Carabeen [*Sloanea woollsii*] and the relative air humidity. A contact-type hygrometer is suitable for measuring the m.c. of such veneers. A composite curve is satisfactory for the determination of the m.c., and by its use a standard error of 0·90% for a single observation is given for the method. Treatment with borax or H_3BO_3 does not affect this method. *From authors' summary.*

2173. Krpan, J. Istraživanja higroskopske ravnoteže vlage uzduha i drveta. **[Investigations on the equilibrium between the moisture content of wood and air humidity.]** *Glasn. šumske Pokuse* 11, 1953 (5–51). 37 refs. [Croat.croat.e.]

The aim of the investigation was to determine the limits of wood moisture content (m.c.) variations in different places in Jugoslavia, and to throw light on the effect of temperature and relative humidity (r.h.) on the air-drying of wood. The author used for evaluation of the equilibrium m.c. the t–ϕ–v chart where t = temperature, ϕ = r.h., and v = equilibrium m.c. (Čulickiĭ's chart compiled from British, American, German and other experimental data) whose indications do not differ by more than 0·5% from those of Loughborough's chart. It was found that if r.h. remains unaltered, a 10° C. change in air temperature causes a m.c. change (if any) of $< 1\%$; a 10% change in r.h. at constant temperature causes a m.c. change of 1·4–7·0%. The equilibrium m.c. of wood is approximately $v = \frac{1}{5}\phi$; this formula can be used for $30 < \phi < 82\%$ m.c. and $-2{\cdot}9 < t < 26{\cdot}0°$ C. The mean equilibrium m.c. changes from one decade to another by $< 1\%$. The author introduces the concept of the 'ligno-isohygric line', i.e. a line on the map connecting places with the same equilibrium m.c., and discusses the 14, 16 and 19% lines in Jugoslavia.

2174. Thomas, A. V., and Menon, P. K. B. **Shrinkage of Malayan timbers.** *Malay. Forester* 17 (4), 1954 (208–9).

Tabulates average % shrinkage from green to air-dry (15% moisture content) of boards sawn from 72 timbers grown in Malaya and tested at the Timber Research Laboratory, Kepong.

2175. Morschauser, C. R., and Preston, S. B. **The effect of ray tissue on transverse shrinkage of Red Oak (*Quercus borealis* Michx.f.).** *Mich. Wood Technol.* No. 1, 1954. pp. [2]. 10 refs. P.R.

Tests have shown that radial shrinkage of broad ray tissue in Red Oak is very small compared with that of adjacent fibre tissue (perhaps owing to low fibre saturation point and density). There is no appreciable difference between radial and tangential shrinkage of fibre tissue. The rays are certainly an important factor contributing to differential transverse shrinkage.

2176. Stevens, W. C., and Johnston, D. D. **Moisture movement through wood.** *Wood* 19 (10), 1954 (400–7). 10 refs.

Moisture gradients in and rate of flow through 1-in. panels of Douglas Fir, after prolonged exposure to water on one face and to air (at 25° C., 60% r.h.) on the other faces, were determined. The diffusion coefficient based on these data is shown to vary with moisture content. The effect of paint films, applied to the 'dry' and 'wet' faces, on the moisture gradients, and the applications of these results to wooden barrel and boat making is discussed. [Cf. *For. Abstr.* 15 (Nos. 660–1).] *From authors' summary.*

2177. Haselton, W. R. **Gas adsorption by wood, pulp, and paper. I. The low-temperature adsorption of nitrogen, butane, and carbon dioxide by Sprucewood and its components.** *Tappi* 37 (9), 1954 (404–12). 26 refs. P.R.

Results of investigations on specimens of Spruce wood, chlorite holocellulose and KOH-extracted chlorite holocellulose showed that the nature of the adsorption of both butane and N on Spruce and its major components is such that either gas can be used for area measurements on cellulosic materials. CO_2, however, appears to be soluble in the non-cellulosic constituents of wood, so it is not suitable for area studies when these materials are present. Even on fairly pure cellulose, a moderately strong attraction such as hydrogen bonding of the adsorbed gas molecules seems to follow from the isotherm and differential heat considerations. N gives better results than butane. *From author's summary.*

812.3. Density. Specific Gravity. Buoyancy

See also Nos. 1459, 2181, 2185.

2178. Kennedy, R. W., and Wilson, J. W. **Studies on smooth and cork-bark *Abies lasiocarpa*. II. Specific gravity comparison.** *Pulp Paper Mag. Can.* 55 (9), 1954 (119–21). 4 refs. (*Res. Pap. Fac. For. Univ. B.C.* No. 8.)

[Cf. *For. Abstr.* 16 (No. 872).] Measurements were made by the water-immersion method on material from three matched pairs of smooth- and cork-barked trees, with d.b.h. (u.b.) of 4·8, 9·5 and 11·7 in. Results are shown in graphs and tables

and the following conclusions drawn: (1) At comparable b.h./age values, cork-barked trees have a significantly higher basic density (b.d.) [oven-dry wt./max. vol.] than that of smooth-barked trees. (2) B.d. varied significantly with age, with a minimum at 50–70 years. (3) Young cork-barked trees have a high bark/wood ratio and cannot be harvested profitably at less than 18 in. d.b.h. (o.b.). Above this their high b.d. offsets the thick bark.

812.7. Strength Properties

See also Nos. 2106, 2208, 2267, 2273–4, 2276–84, 2373.

2179. **List of publications on mechanical properties and structural uses of wood and wood products.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*200, 1954. pp. 51. P.R.

References to American literature.

2180. NAKATO, K. [**A view of the optimum number of samples in strength tests on wood.**] *J. Jap. For. Soc.* 36 (9), 1954 (263–6). 6 refs. [Jap.e.]

Presents an equation for calculating the optimum number of samples. *From author's summary.*

2181. RADCLIFFE, B. M. **The influence of specific gravity and rate of growth upon the mechanical properties of Sugar Maple in flexure.** *Sta. Bull. Ind. agric. Exp. Sta.* No. 597, 1953. pp. 26 + [1]. 19 refs.

The correlations between sp. gr. on the one hand and modulus of elasticity and modulus of rupture on the other, as determined from 353 static bending tests, were found to be highly significant; the correlation between sp. gr. and stress at the limit of proportionality was significant. Simple regressions between rate of growth and the 3 mechanical properties did not show significant correlation.

2182. **The mechanical properties of some Uganda timbers.** *Timb. Leafl. For. Dep. Uganda* No. 1, 1954. pp. 1. 3 refs.

Data compiled from published and unpublished sources for 49 species (3 exotic) growing in Uganda, nearly $\frac{2}{3}$ of which are West African also.

2183. BELL, E. R., PECK, E. C., and KRUEGER, N. T. **Modulus of elasticity of wood determined by dynamic methods.** *Rep. U.S. For. Prod. Lab., Madison* No. 1977, 1954. pp. 10 + 2 dgms. + 2 gphs. + 4 tbls. 12 refs. P.R.

Reviews data from studies made since ca. 1935 to compare results obtained by sonic methods with those from static tests, and presents the results of the authors' own determination of longitudinal and transverse moduli of elasticity by resonant vibration in the audio-frequency range on 40 specimens of second-growth Douglas Fir and on a few specimens of other species. The effect of shear deformation in both the static and sonic transverse tests reduced observed values of the modulus by ca. 10%. After a correction for this effect was introduced, the modulus determined by sonic methods was ca. 11% higher than that obtained by static methods. The difference is, perhaps, caused by the inequality of deformations brought about by the methods themselves. [Cf. *For. Abstr.* 13 (No. 633).]

2184. SAWADA, M. **Deflection of wood beams.** *J. Jap. For. Soc.* 36 (10), 1954 (275–9). 4 refs. [E.jap.]

Equations are presented for calculating, for a given stress and strain distribution in a simple beam, the deflection at the centre of the beam in the plastic region, using Young's modulus and compression strength. In test beams of *Picea jezoensis* and *Quercus crispula* computed and measured deflections showed agreements sufficient for practical use.

2185. YLINEN, A. Über die Beziehungen zwischen Spätholzanteil, Rohwichte, Jahrringbreite, Feuchtigkeitsgehalt und den Elastizitätsmoduln beim finnischen Kierfernholz. **[Relationships between the late-wood %, density, growth-ring width, moisture content and the moduli of elasticity of Finnish Pine.]** *Holz Roh- u. Werkstoff* 12 (7), 1954 (253–8). 4 refs. [G.g.] P.R.

The author assumes that wood (at least small specimens taken at a considerable distance from the stem axis so that the growth rings are approximately linear) is a material made of alternating early- and late-wood (e.w. and l.w.) lamellae, and that it can be treated approximately as an orthorhombic crystal as far as its elastic properties are concerned. The moduli of elasticity E_L, E_T and E_R (in the longitudinal, tangential and radial direction, respectively) are then expressed as a function of the l.w. proportion (in terms of area) and, by eliminating the latter both from the formulae obtained and from formulae expressing the basic density as a function of l.w. proportion, the following formulae are obtained:

$$E_L = \frac{1}{r_{s0} - r_{f0}}\left[(E_{Lf}r_{s0} - E_{Ls}r_{f0}) + (E_{Ls} - E_{Lf})r_0\right];$$

(for E_T the formula is the same with the substitution of the term E_T for E_L)

$$E_R = E_{Rf}E_{Rs}(r_{s0} - r_{f0})/[(E_{Rs}r_{s0} - E_{Rf}r_{f0}) - (E_{Rs} - E_{Rf})r_0],$$

where r_0 is the basic density, and the subscripts s and f denote l.w. and e.w., respectively. Hence, while E_L and E_T vary linearly with basic density and proportion of l.w., the relationship is hyperbolic for E_R. These relationships agree well with experimental results obtained in 1928–45 with Pine wood in the laboratory of the Finnish Valmet aircraft factory, and with results of later tests on E_T and E_R conducted there. Because of the relative scarcity of data for the determination of E_T and E_R, these values are known with less certainty than E_L. Several graphs show also the relationship between the various moduli and the growth-ring width, moisture content and l.w. % for various basic densities.

2186. KISSER, J., and LINHARDT, G. Die mikroskopische Analyse des Verlaufes der Lastkurve beim Stempeldruckverfahren. **[Microscopic analysis of the shape of the loading curve in the stamp-pressure method.]** *Holz Roh- u. Werkstoff* 12 (9), 1954 (329–34). 6 refs. [G.g.] P.R.

Sections were investigated under a microscope of wood subjected to the 'stamp-compression' test (hardness test with a flat-surfaced compression head) as developed by Hoeffgen [*Holz Roh- u. Werkstoff* 1 (8), 1938 (289–93)]. The samples, of

clear Spruce (moisture content 10–15%), measured 2 × 2 × 3 cm., and the circular 'stamp' used had an area of 0·5 sq. cm. Pressure was applied to the end-grain surface, and the rate of loading was 50 kg./sq. cm./min. In accordance with Hoeffgen's findings, the first peak loads, though high, did not cause appreciable indentation; at a certain moment the wood began to yield, with some load decrease, after which the load rose again; further compressions followed even during the periodic falls in load. The periodic increase and fall of the load occurred several times, the corresponding compressions (indentation depths) increasing steadily, and suddenly reaching a large value at, roughly, the 7th load decrease. The microscopic investigation revealed that: (1) before the first load decrease, only the free ends of the fibres were bent and compressed; (2) when the first load decrease was reached, the fibre walls in late wood were crushed, their lumina partly closed, and the middle lamellae partly split; (3) the behaviour of early and late wood was different in that the latter was compressed to a more homogeneous mass than the former; (4) the following 3–4 load variations gave almost the same picture; while (5) from the 5th load peak the incipient slip lines below the crushed surface layer began to multiply and form, first micro-, and then local fibre ruptures.

The 'stamp-compression hardness'/compression-strength ratio was determined as 1·27 (Hoeffgen's value is 1·18). The inequality between the hardness and strength value is explained by the shear phenomenon in the 'stamp-compression' hardness test.

812.8. Workability. Working Properties

2187. Davis, E. M. **Some machining properties of Engelmann Spruce.** *Rep. U.S. For. Prod. Lab., Madison* No. 1944–7, 1954. pp. 4. P.R.

Contains information on planing properties, feed rates and cutter-head speeds, cutting angles, depth of cut, shaping and turning.

813. *Wood Chemistry*

See also Nos. 2423 *et seq.*

2188. Šarkov, V. I., Efimov, V. A., Muromceva, V. S., and Calikova, A. V. K voprosu o himičeskoĭ neodnorodnosti drevesiny sosny i eli v predelah stvola. **[Chemical heterogeneity of Pine and Spruce wood within the stem.]** *Ž. prikl. Him.* 26 (6), 1953 (626–39). 6 refs. [Russ.russ.] P.O.

It was found that the proportion of volatile acids (ca. 97% acetic and 3% formic acid) increases from pith to periphery; pentosans and xylan increase from periphery to pith and from butt to top, and mannan increases from pith to periphery and from butt to top.

2189. Anderson, E., Wise, L. E., and Ratliff, E. K. **Note on the chemistry of the cambial zone of Black Spruce.** *Tappi* 37 (10), 1954 (422–4). 5 refs. P.R.

The dry material of the cambial zone of *Picea mariana* was shown to be rich in sucrose-containing extractives; it also contained protein, some pectic material, but very little lignin and small amounts of cellulose and hemicelluloses. The lignin/cellulose ratio in the cambium was much lower than that found even in young Spruce wood.

813.1. Chief Organic Constituents. Constituents of the Cell Wall

See also Nos. 2155, 2177.

2190. Wacek, A. von, Härtel, O., and Meralla, S. Über die Wirkung von Coniferinzusatz auf die Verholzung von Fichtengewebe bei Kultur in Vitro. **[Effect of the addition of coniferin on the lignification of Spruce tissue cultivated *in vitro*.]** *Holzforschung, Berlin* 8 (3), 1954 (65–7). 8 refs. [G.g.e.] P.R.

The phloem of living Spruce tissue showed a strong reaction with phloroglucinol-HCl, particularly in the rays, after cultivation on a coniferin-containing medium. [Cf. *For. Abstr.* 15 (No. 684).]

2191. Seifert, K. Über neue Reaktionen des nativen Lignins. **[New reactions of native lignin.]** *Faserforschung und Textiltechnik, Berlin* 4 (8), 1953 (342–6). 25 refs. [G.] P.O.

Tabulates 32 organic compounds of different chemical functions, and the colour reactions they give when in contact with (*a*) phloroglucinol, (*b*) *p*-phenylenediamine, and (*c*) acetylacetone. Comparison with colour reactions of wood lignin seems to point to its nature as a complex possessing, on the one hand, an unsaturated lateral chain (like anethol and eugenol), and, on the other hand, a phenol-hydroxyl in *p* position (also alkoxyl). Pine sawdust free from resin was treated with acetylacetone + HCl over a water-bath, after which the reaction product was separated into filtrate (purple-brown) and residue (white fibres). The filtrate was evaporated, yielding a yellow precipitate, the elementary analysis of which tallied with that of lignin; its yield was 27–30%, methoxyl content 10%, molecular weight ca. 900; it was soluble in acetone, dioxane, pyridin, alcohols, $CHCl_3$, acetophenone, HCOOH and hot alkalis. The mother-liquor of this filtrate contained degraded polyoses. The white residue of the main reaction had a composition $C_6H_{10}O_5$ but contained only 70% of α-cellulose. The yield of the residue was 38–42%. The author gives tentative formulae for the [acetylacetone] lignin.

2192. Kürschner, K. Über aromatische Anteile im gewachsenen Lignin. **[The aromatic components of native lignin.]** *Faserforschung und Textiltechnik, Berlin* 4 (11), 1953 (461–4). 3 refs. [G.g.] P.O.

2193. Kürschner, K., and Schweizpacher, T. Ein neues Verfahren zur quantitativen Ligninbestimmung. **[A new method of quantitative determination of lignin.]** *Faserforschung und Textiltechnik, Berlin* 4 (7), 1953 (287–93). 26 refs. [G.g.] P.O.

Describes a new method of determining lignin in lignified membranes, by separating the methoxyl group in the form of methanol under the action of 82% H_2SO_4 at 200° C. Any aldehydes and acids present in methanol are eliminated by distillation from alkali, the methanol then being oxidized to CO_2 by $KMnO_4$ the consumption of which is determined volumetrically. The lignin content is obtained by multiplying the ascertained methanol content by a known factor (5·5 for conifers, 4·0 for broadleaved species).

2194. Ishikawa, H., and Takaichi, K. **[Lignin and lignification (3). A new quantitative method of [determining] lignin by absorption spectra.]** *J. Jap. For. Soc.* 36 (10), 1954 (294–300). 12 refs. [Jap.e.]

The method of obtaining phenol lignin is described and some results of measuring the lignin value in the solution thus obtained from various materials are shown in tables and diagrams with English legends.

2195. Aulin-Erdtman, G. **Spectrographic contributions to lignin chemistry V. Phenolic groups in Spruce lignin.** *Svensk PappTidn.* 57 (20), 1954 (745–60). 46 refs. [E.e.] P.R.

Cf. *For. Abstr.* 14 (No. 3741).

2196. Björkman, A. **Isolation of lignin from finely divided wood with neutral solvents.** *Nature, Lond.* 174 (4440), 1954 (1057–8). 5 refs. [Billeruds AB, Säffle, Sweden.]

It has been found possible to extract about two-thirds of the lignin from Spruce at room temperature after grinding wood sawdust in a vibrational ball mill. To aid the grinding, the wood was dispersed in a liquid (toluene in most of the experiments). The choice of lignin solvent for the extraction of the milled wood is not critical, though the extraction is quicker and more complete with solvents that stand moderate dilution with water without the lignin being precipitated, for example, 'methyl cellosalve' (ethylene glycol monomethyl ether). Depending on the grinding conditions, more or less of the lignin is extracted rapidly, but for maximum yield, the extraction must go on for months. Definite conclusions as to the state of lignin in wood cannot yet be made, but there are indications that few, if any, bonds exist between part of the lignin and the carbohydrates. The new material (milled wood lignin) has been obtained as a faintly cream-coloured powder from Spruce, Pine, Birch, Aspen, Western Hemlock, and Black Spruce, and an evaluation of its authenticity as a chemically unchanged lignin is under investigation. It seems to differ in several respects from Brauns's native lignin. Brauns's native lignin (*a*) and milled-wood lignin (*b*) from the same Spruce log had methoxyl contents of 14·8 and 15·5% respectively after thorough purification; (*b*) dissolves much more slowly than (*a*) in solvents, and solutions of (*b*) are lighter in colour. The contents of phenoxy hydroxy groups in (*b*) were found to be lower than these in (*a*).

2197. Wacek, A., Zeisler, F., and Riegelmayer, P. Über den Methoxylgehalt des Fichtenholzes. **[The methoxyl content of Spruce wood.]** *Monatshefte für Chemie, Wien* 85 (3), 1954 (499–525). 57 refs. [G.g.] L.S.

The lignin contains ca. 85% of the wood methoxyl as determined by the Vieböck-Schwappach method; the portion of the methoxyl content which is not accounted for varies from one treatment to another. The amount of methoxyl separated as methanol is determined for different operations. Ca. ⅔ of the wood methoxyl which does not reappear in sulphuric-acid lignin is recovered as methanol in the hydrolysate, while the remainder may, perhaps, be attributable to simulation by carbohydrates. *From authors' summary.*

2198. Panasjuk, V. G. Harakteristika gidroliznogo lignina. **[Characteristics of lignin from wood hydrolysis.]** *Ž. prikl. Him.* 26 (7), 1953 (763–6). [Russ.russ.] P.O.

This lignin contains 20–30% fewer methoxyl groups than before hydrolysis.

2199. Higuchi, T., Kawamura, I., Morimoto, I., and Kimura, N. **[The formation of lignin in Bamboo shoots. III, IV. Experiments on lignin formation from some precursors, by sections of Bamboo shoot tissue.]** *J. Jap. For. Soc.* 36 (9), 1954 (253–62). 30 refs. [Jap.jap.e.]

[Cf. *For. Abstr.* 15 (No. 4094).] Studies were made on the colour reactions of 5 conifers, 10 hardwoods and 3 Bamboo species, some model substances and 2 lignin extracts, and their absorption spectra, and on the formation of lignin from model substances in incubation experiments with the embryonic root tip of kidney bean and Bamboo shoot tissue, and in experiments with isolated enzymes. [Graphs and tables have English legends.] *From authors' summary.*

2200. Gorrod, A. R. N., and Jones, J. K. N. **The hemicelluloses of Scots Pine (*Pinus sylvestris*) and Black Spruce (*Picea nigra*) [*P. mariana?*] woods.** *J. chem. Soc.* July, 1954 (2522–5). O.R.S.

Acid hydrolysis of extractive-free wood of Scots Pine and Black Spruce has yielded 2-*o*-(4-*o*-methyl-*d*-glucosidurono)-*d*-xylose, 4-*o*-methyl-*d*-glucuronic acid, and *d*-galacturonic acid. The neutral sugars were *d*-xylose, *l*-arabinose, *d*-mannose, *d*-galactose, *l*-rhamnose, and *l*-fucose. Small amounts of 3-*o*-methyl-*l*-rhamnose and glucurone were isolated from the hydrolysate from Black Spruce wood. *Authors' summary.*

2201. Saarnio, J., Wathén, K., and Gustafsson, C. **Structure of an acidic xylan isolated from Birch wood holocellulose.** *Acta chem. scand.* 8 (5), 1954 (825–8). 13 refs. [E.e.] [Centrallaboratorium Ab., Helsinki.] O.R.S.

813.2. Minor Organic Constituents. Extractives. Cell Contents

See also No. 2415.

2202. Kubo, T. **[Scientific study on Japanese Black and Red Pines [*Pinus thunbergii and P. densiflora*].]** *Science Bulletin, Faculty of Agriculture, Kyushu University* 13 (1/4), 1951 (243–7). [Jap.jap.e.] L.S.

A study on pigments, resin chemistry, iron and ash. *From author's summary.*

2203. Duff, S. R., Erdtman, H., and Harvey, W. E. **The chemistry of the natural order Cupressales. XII. Heartwood constitutents of *Chamaecyparis nootkatensis* (Lamb.) Spach. Nootkatin.** *Acta chem. scand.* 8 (6), 1954 (1073–82). 12 refs. [E.e.] [Kungl. tekniska Högskolan, Stockholm.] O.R.S.

2204. Barton, G. M., and Gardner, J. A. F. **The chemical nature of the acetone extractive of Western Red Cedar.** *Pulp Paper Mag. Can.* 55 (10), 1954 (132–7). 26 refs.

[Cf. *For. Abstr.* 15 (No. 4096).] The acetone extractive of butt heartwood of *Thuja plicata* consists of the thujaplicins (including β and γ isomers), thujic acid, methyl thujate, non-volatile neutral oils, water-soluble and -insoluble phenols, in yields of ca. 0·5, 0·5, 0·1, 0·1, 4·5 and 5% respectively. A method of separating these is described. The composition of the water-soluble phenol fraction and the significance of the occurrence of the constituents is discussed. *From authors' summary.*

2205. WADMAN, W. H., ANDERSON, A. B., and HASSID, W. Z. **The structure of an arabogalactan from Jeffrey Pine (*Pinus jeffreyi*).** *J. Amer. chem. Soc.* 76 (16), 1954 (4097–4100). 16 refs. [University of California.] O.R.S.

2206. ROBERTSON, A., and WHALLEY, W. B. **The chemistry of the 'insoluble red' woods. Part VI. Santalin and santarubin [in commercial Sandalwood, Camwood and Barwood].** *J. chem. Soc.* Aug., 1954 (2794–801). [University of Liverpool.] O.R.S.

Cf. *For. Abstr.* 13 (Nos. 646–7).

813.3. Ash Constituents

See No. 2202.

813.4. Chemical Effects of Heat. Chemistry of Thermal Decomposition

See No. 2207.

813.5. Reaction with Metals

See No. 2415.

813.6. Effect of Chemicals on Wood. Resistance to Chemical Attack

2207. BAECHLER, R. H., and STAMM, A. J. **Wood [as material for chemical engineering].** *Industr. Engng. Chem.* 46 (10), 1954 (2127–30). 87 refs. P.R.

A review covering the developments during the period April 1953 to April 1954, under the following headings: preservative and protective treatment; fire-retardant treatments; gluing and laminates; effect of heat; and dimensional stabilization.

2208. BAECHLER, R. H. **Wood in chemical engineering construction.** *J. For. Prod. Res. Soc.* 4 (5), 1954 (332–6). 29 refs. (Technical Session VI of the 1954 national annual meeting of the Forest Products Research Society.)

Gives the results of tests on the bending strength of cross-sections of 6 important species exposed to 5 chemical solutions and of Redwood sections exposed to dilute solutions of 8 chemicals that may be present in water passed through cooling towers.

2209. KURIYAMA, S., and MORI, K. **Pulp. I. Absorption of resorcinol by wood and possibility of chemical combination.** *Journal of the Chemical Society of Japan (Industrial Chemistry Section), Tokyo* 56 (6), 1953 (430–2). 1 ref. [Jap.] From *abstr.* in *Chem. Abstr.* 48 (19), 1954 (11780). P.R.

Wood of *Pinus densiflora* absorbs resorcinol from aqueous solution (pH 1·2–7·0, but much less if pH > 7). Pretreatment of wood with HCl promotes the absorption of resorcinol.

814. *Natural Durability. Old Wood. Fossilized Wood*

See also Nos. 1458, 2370–3, 2391, 2395.

2210. VRIES, H. DE, and BARENDSEN, G. W. **Measurements of age by the carbon-14 technique.** *Nature, Lond.* 174 (4442), 1954 (1138–41). 21 refs.

Describes measurements made on a number of samples of wood from archaeological sites in the Netherlands.

2211. GREGUSS, P. Az Ipolytarnóci alsó-miocén kövesedett famaradványok. **[The Lower-Miocene silicified wood remains at Ipolytarnoc [Hungary].]** *Repr.* from *Földtani Közlöny, Budapest* 84 (1/2), 1954 (91–109 + 52 photos). 47 refs. [Hu.hu.russ.f.] X.

The remains indicate a mostly subtropical flora including Palmaceae, Lauraceae and Magnoliaceae. Analogies between this flora and present N. American species in almost identical association, appear to confirm Wegener's theory of a land bridge between Europe and America in the Miocene.

815. *Effect of Growth Factors on Structure and Properties*

See also Nos. 2106, 2152–4, 2157–60, 2181, 2185, 2188.

2212. KANO, T. **[Forest-biological studies on wood quality. (Report 8.) On the occurrence of compression wood in the Todo-fir [*Abies mayriana*] forest, Atsuta District, Hokkaido.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 71, 1954 (1–14). 5 refs. [Jap.e.]

Discusses correlations of compression-wood occurrence in various ranges of ring width and %s of discoloured areas (rot) with: position, aspect and slope; tree classes; stem height; aspect [?]; angle of slope; and position in the tree and aspect.

2213. KANO, T. **[Forest-biological studies on wood quality. (Report 9.) On the construction of the annual rings of Todo-fir [*Abies mayriana*] grown in Atsuta District, Hokkaido.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 71, 1954 (15–28). 5 refs. [Jap.jap.e.]

Discusses the relations, in normally grown and in lower-storey trees, between the width of the annual ring and the number of cells contained in the early and late wood; the % of late-wood cells; the thickness of cell membranes; the % of cell-wall substance; and tracheid length.

2214. KANO, T. **[Forest-biological studies on wood quality. (Report 10.) On the external appearance, the amount of sapwood and the bark % of standing trees grown in Todo-fir [*Abies mayriana*] forest, Atsuta District, Hokkaido.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 71, 1954 (29–38). 2 refs. [Jap.jap.e.]

Discusses various relations of height, diam. and age of lower-, middle- and upper-storey trees with green crown, dry branch, branch-trace and clear length; % sapwood; rate of heartwood maturation; bark % and bark/sapwood ratio.

82. CONVERSION, SHAPING, ASSEMBLY AND FINISHING OF WOOD: GENERAL

821. *Barking*

See also No. 2257.

2215. HOLEKAMP, J. A. **Developments in sawmill waste utilization equipment [: barkers and chippers].** *J. For. Prod. Res. Soc.* 4 (4), 1954 (18*A*–22*A*).

2216. BRECHT, W., BOTT, R., and WENZ, M. Untersuchung einer Karlström-Entrindungsanlage. **[Investigation of a Karlström barking plant.]** *Papier, Darmstadt* 8 (7/8), 1954 (120–8). 6 refs. [G.g.] P.O.

Presents the results of a study of a Karlström-type barker (steaming followed by water-jet barking) with regard to efficiency and power requirement.

2217. **Cowichan hydraulic log barker.** *B.C. Lumberm.* 38 (9), 1954 (102).

Claimed to be unique, the installation and working of a 60-ft. ring barker mounted in a barge (40 × 80 × 6 ft.) in the booming ground is described.

822. *Saws and Sawing*

See also Nos. 2256 *et seq.*

2218. ANDREWS, G. W. **Adjustable sawmilling gauge.** *B.C. Lumberm.* 38 (10), 1954 (34–6).

Describes with illustrations and working drawings a spring-loaded gauge capable of exerting a force of 100 lb./in. of travel, developed by the Forest Products Laboratories of Canada to increase sawing accuracy.

2219. ANTOINE, R. Étude générale de l'usinage des bois. **[General study in sawing timbers.]** *Rapp. Inst. nat. Étude agron. Congo belge 1953*, 1954 (500–1). [F.]

[Cf. *For. Abstr.* 15 (No. 2876.)] Makes recommendations from studies with variants of what is considered the most suitable form of [band] saw, the LFL (Laboratoire forestière Louvain), for *Gilbertiodendron* [*Macrolobium*] *dewevrei*, *Celtis mildbraedii* and *Chlorophora excelsa* respectively: Saw speeds, 1000–1200 and 1000 m./min. [not given for *Chlorophora*]. Bites, with 20 cm. depth of cut, 500, 400 and 800μ. Hook and pitch, 10–15° and 50 mm. Feed rate varies inversely with depth of cut; for *Celtis* with a bite of 400μ and depth of cut of 20 cm. it would be 16 m./min. This timber requires a clearance angle of ca. 5°. *Chlorophora* (under further study) is easy to saw and can be converted at high feed rates. *Musanga cecropioides* requires a hook of 40°. *Guarea laurentii* requires a similar tooth to that for *Chlorophora*, but saw speeds slower than 1000 m./min. *Parinari* sp. also requires a drastic reduction in saw speed. Kerf in these studies was $2x + e$, where $x = 0{\cdot}5$ mm. and e = thickness of blade.

2220. Étude des bois. **[Timber study, [a sawing study at Nioka Station, Ituri].]** *Rapp. Inst. nat. Étude agron. Congo belge 1953*, 1954 (452–3). [F.]

Gives the % sawn-timber yield from logs of *Fagara melanorhachis*, *Olea hochstetteri*, *Chrysophyllum fulvum*, *Croton macrostachys*, *C. mubango* and *Parinari holstii*, using a 'Forestière CD 4' saw powered by a Ford V8 motor. The best linear saw speed is ca. 25 m./sec. The tooth shape ('denture mariée') and pitch (35 mm.) used were suitable, but the hook could be advantageously altered from 7° to 12 or 16°. The valuable species (first three) are the easiest to saw.

2221. HYLER, J. E. **Cutting round holes in wood.** *Wood-Worker, Indianap.* 73 (7), 1954 (14, 16–7). P.R.

The design and operation of hole-saws for cutting round holes or discs are described.

823. *Planing, Cutting of Mouldings. Chiselling, Mortising and Tenoning. Boring. Turning.*

See also No. 2187.

2222. TSCHERNJAKOW, K. Stand und Entwicklungslinien im Bau von Hobel-, Fräs-, Kehl- und Schlitzmaschinen. **[Present state and trends in the design of planing, moulding and tenoning machines.]** *Holz Roh- u. Werkstoff* 12 (4), 1954 (134–51). [G.g.] P.R.

Based on the machines exhibited at the 1954 Hanover Fair.

2223. **Technical session III [of the 1954 national annual meeting of the Forest Products Research Society]—wood machining.** *J. For. Prod. Res. Soc.* 4 (5), 1954 (234–54).

Contains the following papers: Development work on wood planers (*J. C. Petter*; 6 refs.); Machining tests on wood with the molder [: the effect of feed rate, cutter-head speed, knife cuts/in., knife materials, moisture content of the wood, and species on quality and power consumption] (*E. M. Davis* and *H. Nelson*); Wood machining research with high speed motion pictures (*R. J. Hoyle, Jr.* and *W. A. Cote, Jr.*); and Machining wood with coated abrasives (*N. C. Franz* and *E. W. Hinken*).

2224. HVAMB, G. En del sammenlignende målinger av råvareutnyttelsen ved høvling med 16 knivers kutter og med vanlig planboks. **[A comparison of planing loss using a 16-knife rotating cutterhead and the ordinary fixed-knife planer.]** *Norsk Skogind.* 8 (11), 1954 (383–6). [Nor.e.] [Norsk Treteknisk Institutt.] P.R.

Use of the 16-knife cutterhead gave a saving of about 0·4 mm. in the depth of cut required. Its power consumption was a little higher than with the normal planer. No very definite results as regards surface quality were obtained. Further work is planned.

824. *Forms of Joint. Jointing and Assembly*

824.4. Dowelled Joints

2225. SELBO, M. L. **Jig for aligning scarf joints [while drilling them for dowels].** *J. For. Prod. Res. Soc.* 4 (4), 1954 (43*A*–45*A*). [Forest Products Laboratory, Madison, Wis.]

2226. BROWN, G. E. **Water-resistant dowel glue.** *J. For. Prod. Res. Soc.* 4 (4), 1954 (42*A*–43*A*).

A neat urea resin syrup applied to the dowel hole is catalysed to gel when the dowel coated with AX powder catalyst is placed in position.

824.5. Timber Connectors

2227. Stoy, W., and Löhr, H. Über die Beeinflussung der Tragfähigkeit von GEKA-Holzverbindern durch Verwendung dünnerer Schraubenbolzen und Unterlegscheiben. **[Effect of the use of thin bolts and washers on the bearing capacity of the GEKA timber connector.]** *Holz Roh- u. Werkstoff* 12 (2), 1954 (64–7). [G.g.] P.R.

Tests showed that, at variance with the German standard DIN1052, the GEKA timber connectors of 115 mm. diam. should be used with 24-mm. bolts (not 1-in.) and with 96/8 [96 mm. diam. and 8 mm. thickness] washers (instead of 105/8).

824.6. Carpenters' and Joiners' Joints

2228. Pavlov, V. P. Soprjaženie drevesiny po dline na zubčatyĭ šip. **[Multiple-scarf joint used for joining timber lengthwise.]** *Derev. lesohim. Prom.* 3 (10), 1954 (5–8). [Russ.] P.R.

Presents in graphs the results of an investigation on the effect on tensile and bending strength of (1) the scarf-tooth slope, (2) blunting of the tooth edges and (3) tooth length, in glued multiple-scarf joints. Change of the tooth-spacing/length ratio of a multiple-scarf joint from 1/16 to 1/8, had no effect on the strength properties, but when this ratio exceeded 1/8, strength began to fall. Blunting of the scarf-tooth edges to a width $> 0{\cdot}5$ mm. also reduced strength. Length of joint (length of tooth) had hardly any effect on strength for length values 1–14 mm.; below 1 mm. the strength fell rapidly towards the value for the end-on joint. A pressure of 3–6 kg./sq. cm. of cross-section is recommended for joining timber with the multiple-scarf joints. Describes the manufacture of fire-ladder stringers using such joints.

2229. Otlivančik, A. N. O pročnosti šipovyh soedineniĭ. **[Strength of comb joints.]** *Derev. lesohim. Prom.* 3 (10), 1954 (8–9). [Russ.] P.R.

Comparative tests showed that, for the same tooth spacing, the comb joint is stronger than the dovetailed joint. Reducing the tooth spacing in a comb joint increases its strength, though the 'specific strength' (kg./sq. cm. of glue-line area) decreases somewhat.

824.7. Glued Joints

See also section 824·8 and Nos. 2226, 2228–9, 2269–70, 2275 *et seq.*

2230. Richards, D. B. **Salvaging lumber shorts by end jointing.** *J. For.* 52 (10), 1954 (739–40). 3 refs.

Gives data for strength of joints, methods of gluing and cutting, comparative costs and uses.

824.8. Glues and Gluing

See also Nos. 2207, 2226, 2315.

2231. Hyler, J. E. **Glues and gluing. Parts 45 to 49.** *Sth. Lumberm.* 182 (2364–2368), 1954 (45 . . . 48; 45 . . . 49; 43 . . . 48, 63–4; 37 . . . 41; 37 . . . 42).

Veneer jointers, splicing equipment and glues, flat gluing, glue spreading methods and equipment.

2232. **Technical session V [of the 1954 national annual meeting of the Forest Products Research Society]—glues and gluing.** *J. For. Prod. Res. Soc.* 4 (5), 1954 (283–314).

Contains the following papers: Boil resistance of blended urea-melamine wood adhesives (*S. H. Rider* and *S. E. Kozdemba*; 8 refs.); Advances in polyvinyl acetate glues for woodworking (*P. H. McCormack*; 9 refs.); Evaluation of glues and glued products (*R. F. Blomquist*; 14 refs.;) Gluing preservative treated wood with resorcinol type adhesives (*W. T. Henry* and *R. E. Gardner*; 3 refs.); Production gluing of high strength glue joints (*T. W. Berry*); Application of impreg for patterns and die models (*R. M. Seborg* and *A. E. Vallier*; 13 refs.); and Designing with glued wood construction (*R. B. Fuller*).

2233. Davies, E. A. **Adhesives in the woodworking industry.** In *Adhesion and Adhesives. Fundamentals and Practice*, Society of Chemical Industry, London 1954 (99–103). 6 refs. P.R.

Lists the types of glues commonly used, their durability, and tabulates their properties and applications.

2234. **Protein adhesives for plywood.** *Aust. Stand. A.S.* No. *K*.89–1953, 1953. pp. 9. Price 4*s.* P.R.

2235. Takashima, T. **[Researches on blood glue (VII). Hot press[ing] whole blood glue (2).]** *J. Jap. For. Soc.* 36 (10), 1954 (288–90). 4 refs. [Jap.jap.e.]

[Cf. *For. Abstr.* 14 (No. 2682).] Results of tests show that the glue is highly water-resistant and can be made more so by adding small amounts of Cu salts, that the plywood exposed to sunlight and various atmospheric conditions is relatively durable, and that the storage life of the glue protected from moisture is quite long. *From author's summary.*

2236. Watanabe, H., and Takakuwa, F. **[Decreasing [*sic*] glue spread by foaming boil-proof plywood glues.]** *Wood Ind., Tokyo* 9 (10), 1954 (470–6). 2 refs. [Jap.e.] P.R.

Resin glues were foamed with saponin to a volume of 2–2½ times the original, and would then spread readily to a uniform rate of 18 g./sq. ft. Bonding strengths for the glues, other than urea resin containing free melamine, were satisfactory and occasionally superior to those spread normally.

2237. **Dry film plywood glue.** *Veneers & Plyw.* 48 (8), 1954 (23–4). P.R.

Describes the use of 0·005-in. phenolic-resin hot-press glue films for gluing fragile and thin face veneers to a reinforcing veneer, before gluing the plywood components by means of the liquid glue spread on the veneer faces; this procedure prevents penetration of glue through the face veneer.

2238. Preston, S. B. **The influence of phenolic resin adhesives on the shrinkage properties of veneer laminates.** *Mich. Wood Technol.* No. 4, 1954. pp. [3]. 7 refs. P.R.

Tests show that the dimensional change in the glue-line plane, caused by a change in moisture content, is restrained by film-type (not by powder-type) phenol-formaldehyde glue. For both glue types, shrinkage at right angles to the glue line increases as veneer thickness decreases.

2239. EGNER, K., and BRÜNING, H. Einflüsse auf die Aushärtungsgeschwindigkeit von Leimverbindungen im hochfrequenten Kondensatorfeld. **[Factors affecting the rate of hardening of glue joints in an H.F. condenser field.]** *Holz Roh- u. Werkstoff* 12 (9), 1954 (334–42). 9 refs. [G.g.] P.R.

Presents in graphs the results of tests in a condenser field to determine the effect of electrode arrangement, frequency, wood species, and glue (thickness, nature, hardener, viscosity).

2240. STIEDA, W., and GRAHLMANN, H. (to Focke-Wulf Flugzeugbau G.m.b.H.). Verfahren zur Verleimung von vorkonservierten Holzflächen. **[Method of gluing wood surfaces which have been previously treated with preservatives.]** *German Patent* No. 851,100, Oct. 2, 1952. pp. 2. [G.] P.O.

Wood treated with a di-isocyanate type (hardening) preservative can be glued with a compatible adhesive, e.g. that containing di-isocyanates or hardening phenol resins.

825. *Cleaving. Adzing. Mechanical Comminution*

See No. 2215.

827. *Bending. Moulding (other than by Cutting)*

See also No. 2397.

2241. TACK, C. H. **Bending timbers.** *Tech. Note For. Dep. Uganda* No. 13/54, 1954. pp. 3. 1 ref.

Excerpts from the latest revision of *Leafl. For. Prod. Res. Lond.* No. 45 [cf. *For. Abstr.* 11 (No. 2914)] the data for 21 Uganda timbers.

829.1. *Finishing*

See also Nos. 2288, 2326.

2242. **List of publications on wood finishing subjects.** *Rep. U.S. For. Prod. Lab., Madison* No. 454, 1954. pp. 18. P.R.

References to American literature.

2243. **Technical session VII [of the 1954 national annual meeting of the Forest Products Research Society]—wood finishing.** *J. For. Prod. Res. Soc.* 4 (5), 1954 (339–59).

Contains the following papers: Factors to be considered in force-drying wood finishes (*K. R. Brown*; 8 refs.); Natural wood finishes for exteriors of houses (*D. F. Laughnan*); Testing of finishing materials for woodworking (*D. G. Lubeck*); Evaluation of floor finishes (*R. R. Blumenstein*); and Ovens for drying wood finishes (*W. Herdlein*).

2244. GALLAK, V. M. **The chemical dyeing of wood with nitrogen oxides.** *Derev. lesohim. Prom.* 3 (4), 1954 (10–1). [Russ.] From *abstr.* in *Chem. Abstr.* 48 (16), 1954 (9603*h*). P.R.

Treating Aspen, Pine, Birch, Beech and Oak wood with N oxides (5 min. in gaseous NO_2, or 10–15 min. in $FeSO_4$ solution, followed by treatment with NO for 30 min.) imparts an orange-brown colour to the wood surface, and increases its resistance to insects and bacteria.

2245. DENISTON, G. L. (to Chadeloid Corp.). **Stain filler compositions and pigmented fillers therefor.** *U.S. Patent* No. 2,628,206, Feb. 10, 1953. pp. 3. 3 refs. P.O.

A combined wood stain and filler in the form of a solution-suspension, comprising tetrahydrofurfuryl alcohol, 1–15 parts by weight of dyestuff, 5–100 parts of an air-drying phthalic anhydride glycerol resin, 5–30 parts of polyvinyl alcohol, 10–120 parts of hydrated precipitated Ca silicate, with or without morpholine.

2246. DENISTON, G. L., and BERGLUND, O. W. (to Chadeloid Corp.). **Stain filler sealer.** *U.S. Patent* No. 2,628,947, Feb. 17, 1953. pp. 3. 2 refs. P.O.

A method of staining, filling and sealing wood in a single operation.

2247. TEESDALE, L. V. **Water-repellent preservatives reduce rain-caused paint blistering on wood siding.** *Rep. U.S. For. Prod. Lab., Madison* No. 1990, 1954. pp. 5 + 8 photos + 1 dgm. 3 refs. P.R.

Laboratory tests showed that entry of water through house siding can be much reduced by dressing the back of the siding so as to form a tight joint which can be sealed with paint; the siding should be treated with a water-repellent preservative before it is nailed to the house, and the same preservative should be applied to the siding before repainting.

2248. MUTSCHLER, M. Die Schleifmaschinen der mechanischen Holzverarbeitung. **[Polishing machines used in woodworking.]** *Holz Roh- u. Werkstoff* 12 (4), 1954 (158–63). [G.g.] P.R.

Machines shown at Hanover Fair 1954.

2249. LÜTHGENS, M. Untersuchungen über Blasen- und Rissbildungen polierfähiger Lackfilme auf Holzoberflächen. **[Investigations on the formation of blisters and cracks in polishable lacquer films on wood surfaces.]** *Holz Roh- u. Werkstoff* 12 (7), 1954 (271–7). 31 refs. [G.g.] P.R.

Blisters or bubbles formed sometimes when temperatures $> 60°$ C. are used to speed up the drying and setting of lacquer films on wood, were examined microscopically, and classified into (1) minute ones generated inside the film itself, and (2) larger ones formed under the film by air inclusions in the tracheids (particularly in the case of ring-porous and tropical woods). Both can be prevented by an appropriate gradual increase of temperature and by filling the pores. The following were found to cause cracks in lacquer films: (1) the composition of the lacquer itself, (2) transfer of wood stresses, and (3) cracks in veneer.

2250. GRISARD, J. F., and BECQUET, J. P. Procédé de vieillissement artificiel des bois. **[Method of artificial ageing of wood.]** *French Patent* No. 1,001,462, Feb. 25, 1952. pp. 2. [F.] P.O.

The ageing is brought about by the heat of saturated steam.

2251. DICKINSON, T. A. **Now you can spray leather finishes on wood.** *Wood, Chicago* 59 (10), 1954 (23). P.R.

In the method described, an elastomeric adhesive is dispersed with leather dust in a solvent to obtain a

fluid which can be applied by brushing, spraying or dipping.

2252. CHAPMAN, D. **Wood products and method of making.** *U.S. Patent* No. 2,574,375, Nov. 6, 1951. pp. 5 + 9 dgms. 2 refs. P.O.

A generally uniform design is applied to wood which has a surface with a visible natural grain; the design comprises small design elements which cover at least a considerable fraction of the wood surface and are spaced apart, leaving some of the surface uncovered; these elements have at least one dimension parallel to the wood surface, this dimension being so small as to make the elements inconspicuous at the usual viewing distance. The design elements may be formed by printing, or by applying different particles, such as metal, mineral, plastic, sawdust, fabric etc.

83. TIMBER MANUFACTURING INDUSTRIES AND PRODUCTS. USES OF WOOD AS SUCH

831. *Fuelwood and Various Types of Rough Timber*

See also Nos. 2315, 2333–4, 2341–51, 2399.

2253. MESSAGER, G. Note sur une flambée de poussières de bois survenue le 16 septembre 1952 au puits Cambefort des houillères du bassin de la Loire. **[Ignition of wood dust at Cambefort pit (Loire coalfield).]** *Annales des Mines, Paris* 142 (11), 1953 (55–9). [F.] P.O.

Firing of an unstemmed shot produced an explosion which ignited wood dust accumulated at the foot of worm-eaten wooden supports.

2254. WYMOND, A. P. **A survey of fencing practice in Australia.** *Aust. For.* 18 (1), 1954 (33–40).

During late 1953 and early 1954, a survey of fencing practices was made throughout Australia. Its main purpose was to obtain data on which to base recommendations for preservative treatment of fence posts. Questionnaires were sent to nearly 700 farmers and graziers in six States, and over 400 were returned. Information on species used, cost, life, and causes of failure of posts was obtained. The survey established that the majority of farmers contacted prefer wooden posts, and are interested in preservative-treated round posts. *From author's summary.*

2255. BEESLEY, J. **Sub-project P.2–2: A survey of the causes of service failure of crossarms throughout Australia. Seventh (final) progress report. Summary of results, conclusions, and recommendations.** Division of Forest Products, C.S.I.R.O., Melbourne. 1954. pp. 27 + iv + [1]. P.R.

[Cf. *For. Abstr.* 15 (Nos. 4168–9).] The results of the survey, begun in 1947, of over 6400 crossarms in all 6 states, show that most commercial Eucalypt timber species are suitable for this use. Ca. 20% of all cross-arms dismantled were still in serviceable condition. Of the cross-arms that failed in service, ca. 50% were condemned for decay and 35% for splitting. Recommendations include changes in standards of acceptance of timber, modifications to seasoning practices, pressure impregnation with preservative oils, and the use of mechanical devices to reduce splitting. *From author's summary.*

832. *Mills, Their Functions and Products*

832.1. Sawmills and Planing Mills

See also Nos. 2218 *et seq.*

2256. TELFORD, C. J. **Small sawmills: a pocket guide.** *Agric. Handb. U.S. Dep. Agric.* No. 70, 1954. pp. 26. 4 refs. Price $0·15.

Covers: setting up the mill and equipment, and checking for mechanical fitness; ensuring correct dimensions of sawn timber; fitting and servicing the saw; and some special sawing problems.

2257. HYLER, J. E. **Modern sawmilling. Parts 6 to 10.** *Sth. Lumberm.* 182 (2364–2368), 1954 (53–5; 51 . . . 60; 40 . . . 58; 43 . . . 50; 43 . . . 59).

Mill lighting, timber sizes, handling in the mill, uses of waste, barkers.

2258. MATER, M. H. **A report on developments in milling [in the U.S.A.] during 1953.** *J. For. Prod. Res. Soc.* 4 (4), 1954 (31*A*–35*A*). 37 refs.

Discusses volume cut, markets, changes in equipment and methods, research and development, meetings and conferences, and standardization. Includes a bibliography of sawmill literature (mainly N. American) for 1953.

2259. **Sawing patterns and techniques for south-east Queensland hardwoods.** *Aust. Timb. J.* 20 (7), 1954 (531 . . . 541).

Discusses equipment, lay-out and log breakdown recommended to improve yields.

2260. WYLIE, A. E. **Lumber grades and sizes in relation to product yields.** *J. For. Prod. Res. Soc.* 4 (4), 1954 (176–80). 8 refs.

Presents results of a study of actual and log-grade yields from *Acer saccharum* and of the effect of cutting lengths on yield and wastage.

2261. FRONIUS, K. Die Erzeugung von Latten. **[The manufacture of laths.]** *Holz-Zbl.* 80 (154), 1954 (1817–8). 1 ref. [G.]

Describes the quality grades, wood species, cutting procedures, uses and dimensions of laths, in accordance with the German definition standard AWF 74, DIN 4070, and grading instruction PR 20/47 of 27 March, 1947.

832.2. Veneer and Plywood Mills, including the Manufacture of Composite-Wood Assemblies

See also Nos. 2172, 2231 *et seq.*, 2273–84, 2290, 2294, 2299, 2301–2, 2315, 2356, 2396, 2421–2.

2262. NARAYANAMURTI, D. **Composite wood timbers: *Bombax malabaricum* (*Salmalia malabarica*)—Semul.** *Comp. Wood* 1 (4), 1954 (94–103). 28 refs. P.R.

Gives graphical and tabulated data on the physical, strength, durability, peeling, drying, and gluing properties of the wood, and notes on its use in laminates, plywood, and improved wood.

2263. **Trials of timbers for plywood manufacture. Progress report 24–August 1954. Consignment No. 781. Sepetir—*Pseudosindora palustris*.** Forest Products Research Laboratory, Princes Risborough. 1954. pp. 17.

2264. ROBERTSON, J. L. **Decorative wood veneers.** *Emp. For. Rev.* 33 (4), 1954 (329–34 + 1 plate). (*Repr.* from *Journal of the Royal Institute of British Architects*, Oct. 1953.)

Notes on preparation, application and uses.

2265. NARAYANAMURTI, D., and SANJIVA, U. **Veneer drying.** *Comp. Wood* 1 (5), 1954 (111–7). 8 refs. P.R.

Presents, in tables and graphs, the results of preliminary experiments with veneers $\frac{1}{8}$ to $\frac{1}{64}$ in. thick from 11 Indian species. The variation of drying rate with time, moisture content, thickness and density was investigated for 3 types of drying: conduction, convection and radiation.

2266. GOTTSTEIN, J. W., and KAUMAN, W. G. **Project S.7—Veneer drying. Experiment S.7-8-Y-9(*b*). Methods of seasoning 'Ash' Eucalypt veneers: An investigation of aspects of the mechanical drying of Alpine Ash [*Eucalyptus gigantea*] veneers. Working plan.** Division of Forest Products, C.S.I.R.O., Melbourne. 1954. pp. 33 + 1 tbl. 1 ref. Limited distribution. P.R.

2267. PRESTON, S. B. **The effect of synthetic resin adhesives on the strength and physical properties of wood veneer laminates.** *Bull. Yale Sch. For.* No. 60, 1954. pp. 80 + 4 plates. 64 refs. Price $1·50.

2268. **Australian standard specification for plywood for general purposes.** *Aust. Stand. A.S.* No. *O*.6–1954, 1954. pp. 14. Price 5*s*. P.R.

2269. BRYANT, B. S., and STENSRUD, R. K. **Some factors affecting the glue bond quality of hard-grained Douglas Fir plywood.** *J. For. Prod. Res. Soc.* 4 (4), 1954 (158–61). 3 refs.

Results of a study on the effect of veneer-drying temperature, type of glue (5 mixes), veneer quality (veneer cut by 2 separate mills) and the use of sapwood or heartwood veneers on the glue bond were statistically analysed. Veneer-drying temperature was very important, low temperatures giving a better result than high ones. Considerable variation in quality of bond was found between the different glue mixes. Veneers produced at one mill gave consistently better results. Generally heartwood produced better exterior plywood, but with proper peeling and drying sapwood produced an equally good plywood.

2270. LAMBUTH, A. L. **Knifing technique and test method when used in the evaluation of hardboard to Fir glue lines.** *J. For. Prod. Res. Soc.* 4 (4), 1954 (169–70).

A knife method of testing glue joints was used in comparison with shear testing on Plyron, a hardboard panel faced with plywood. Knife results were found to be reproducible and a very severe test of bond quality. The method would be useful in giving a rough estimate of glueline quality in mills.

832.3. Match Factories

2271. **Report of the matchwood working party.** H.M. Stationery Office, London. 1954. pp. 26. Price 2*s*.

Of some 30 species tested (from Africa, British Honduras, British Guiana, New Zealand, Malaya and S. America), none except perhaps *Pinus radiata* would be satisfactory for match production in the U.K. Gives details of requirements, supplies of soft-currency and home-grown timbers, with notes on timbers used for match manufacture in certain overseas countries, and reports on the tests.

2272. PRATT, E. R. **Rotary veneers.** *Quart. J. For.* 48 (4), 1954 (297–9 + 2 photos).

Comments on the Report of the Matchwood Working Party, dealing mainly with available supplies of logs suitable for rotary veneer cutting for matchboxes and match stock. The writer questions the statement that it is impossible to grow sufficient quantities in Britain; *Populus eugenei* is almost as satisfactory as Aspen for this purpose, and grows much faster and larger.

833. *Timber in Buildings and Engineering Structures* (*Manufacture and Use*)

See also No. 2179.

833.1. Building Components and Fittings: General

See also Nos. 2105, 2184, 2338, 2340, 2409.

2273. NORÉN, B. Formar till putsfri betong. **[Formwork and shuttering for smooth concrete.]** Svenska Träforskningsinstitutet (Träteknik), Stockholm. 1954. pp. 32. 6 refs. [Sw.e.] (*Byggnadsindustrins Småskrifter* No. 5, 1954.) P.R.

Standard shuttering of boards 4–5 in. wide is being replaced by large closely fitting panels of thin ($\frac{1}{4}$ in.) plywood or hardboard that give a smooth surface to the concrete. Recommendations on glues, plywood dimensions and spacing of studs are made. Results of bending tests on panels of Swedish Pine at the Svenska Träforskningsinstitut, showing modulus of elasticity and deflection, are tabulated.

2274. SAILLARD, Y., BESSET, J., and BRODEAU, A. L'emploi du contreplaqué-coffrage. **[The use of plywood shuttering [for concrete structures].]** *Repr.* from *Travaux* [*Paris*?] June, 1954. pp. 24. [F.] P.R.

The result of research by the Chambre Syndicale des Constructeurs en Ciment Armé and the Centre Technique du Bois. Discusses the properties required of plywood used for concrete shuttering. Methods of determining the mechanical properties of plywood are described and illustrated, and the results obtained for the modulus of elasticity, and relative deflections are tabulated, graphed and discussed. The merits of plywood shuttering are listed, and details are given of its use in practice.

2275. Le bois. Techniques nouvelles. **[Wood: new techniques.]** *Techniques et Architecture, Paris* 13 (5/6), 1954 (48–85). [F.] P.O.

Includes the following illustrated articles: New wood-based building materials (*J. L. Jandon*);

Tropical building timbers (*P. Sallenave*); New roof constructions and assemblies (*E. Delaporte*); Triangular roof constructions (*A. Moles*); Glued roof constructions (*P. Gauthier*); Wood in rural buildings (*J. Besset*); Use of plywood for concrete shuttering (*J. Besset*); New methods in joinery (*P. Opoix*).

2276. STANLEY, M. S. **Engineering laminates, in particular glued laminated timber construction.** *Aust. Timb. J.* 20 (8), 1954 (584 . . . 613). 7 refs.

A lecture to the Institute of Engineers, Australia, covering *inter alia* advantages, applications, gluing, nailing v. clamping for pressure, selection of timber, joints, timber columns, jigs, permissible stresses, relation of strength to curvature, box-form cross-sections, curved members for 150-ft. spans, durability, design, plywood webs and tests.

2277. **Research on timber structures.** *Quart. Rev. Timb. Developm. Ass.* 4 (3), 1954 (12–5).

Details of technique and some typical results during the last 2 years at the Royal Technical College, Glasgow, in investigations of strain in beams and compound compression members and the design of built-up beams and compound compression members.

2278. **Research in glued joints [I-III].** *Timb. Tr. J.* 211 (4076–4078), 1954 (625–6; 804–6; 980–2).

(I). Compares safe loads for double-lap joints in European Redwood [*Pinus sylvestris*] with axial load ||, for (*a*) a nailed joint and (*b*) a joint made with the urea-formaldehyde glue Aerolite 300, on the basis of initial results in tests at Durham University. Results were greatly in favour of (*b*).

(II). Gives three examples of public buildings in which components with these joints have been incorporated.

(III). Features of the completed projects; their advantages summarized; prospects of future development.

2279. J., J. **Glued timber structures. [With corrigenda suggested by R. T. Walters.]** *Wood* 19 (11; 12), 1954 (442–5; 476–9; 514).

Tabulates safe loads of single and double lap joints in European Redwood with axial load || to grain, for nails, nails and screws in pre-bored holes, bolts, bulldog connectors, split-ring connectors and urea-formaldehyde glue (Aerolite 300) and illustrates the use of the last in public buildings. The development is due to the post-graduate research group in Civil engineering, Durham University. One application incorporates very light, hollow plywood portal frames suitable for clear spans, believed to be the first of their kind.

2280. STAUDACHER, E. **Glued wood structures, their shapes, design, and stresses involved.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1861, 1952. pp. 12 + 3 dgms. Transl. by K. Hirst from *SchrReihe öst. Ges. Holzforsch.* No. 2, 1950 (114–34). [See *For. Abstr.* 13 (No. 2512).] Limited distribution. P.R.

2281. SAWADA, M. **[Studies on the mechanics of wood beams. (Report 1.) Strength and factors affecting it in beams of rectangular cross-section. (Report 2.) Strength of glued laminated beams of rectangular cross-section, consisting of two kinds of wood.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 71, 1954 (39–79, 81–119). 18 refs. [Jap.e.]

(1) A validation by practical test of theoretical equations that give the limiting conditions and bending strength in wood beams of rectangular section under various span/depth ratios and types of loading. Includes tables of the mechanical properties of *Abies mayriana*, *Picea jezoensis*, *Fagus crenata*, and *Quercus crispula*, the species under test.

(2) A similar validation for glued laminated beams with faces of *Quercus crispula* and cores or lower laminae of *Cryptomeria japonica*. The derivation of general equations, and worked examples appear in the English summaries. [Tables and figures have English captions.] *From author's summaries.*

2282. LUXFORD, R. F., and HEYER, O. C. **Glued and nailed roof trusses for house construction.** *Rep. U.S. For. Prod. Lab., Madison* No. 1992, 1954. pp. 4. P.R.

Results of tests showed that, as compared with nailed trusses, glued trusses are much stiffer, fail without warning, and show a much greater reduction of maximum load when exposed to high and low humidities.

2283. STILLINGER, J. R. **Racking tests on quarter-scale diagonally sheathed [Douglas Fir] wall panels.** *Rep. Ore. For. Prod. Lab.* No. *T*-1, 1954. pp. 27 + 4 photos + 1 dgm. + 5 gphs. 11 refs. P.R.

2284. **Hollow-core flush doors.** *Rep. U.S. For. Prod. Lab., Madison* No. 1983, 1954. pp. 12 + 3 photos + 1 dgm. P.R.

Discusses some questions in connexion with the design, manufacture, testing, and use of hollow-core flush doors, and analyses some reasons why their performance is not always satisfactory.

2285. **Flooring timbers.** *Timb. Leafl. For. Dep. Uganda* No. 17, 1954. pp. 2.

Notes on 14 Uganda timbers, 9 of which are also West African.

2286. KÜHNE, H. Materialtechnische Probleme des neuzeitlichen Holzparketts. **[Technical problems relating to modern wood parquet floors.]** *Holz Roh- u. Werkstoff* 12 (9), 1954 (358–64). 12 refs. [G.g.] P.R.

Discusses several problems (water absorption, swelling and shrinkage, hardness, wear, thermal properties, gluing) relating to the use of 'mosaic' parquet, and presents some results and experiences gathered at the Swiss Laboratory for Testing Materials, Zürich.

2287. SUCHSLAND, O., and SUCHSLAND, K. Parkett in Schweden. **[Parquet flooring in Sweden.]** *Repr.* from *Parkett* 1954 (2). pp. 5. 48 refs. [G.] P.R.

Lists types of parquet flooring now used in Sweden and the appropriate floor-laying techniques. Discusses the maintenance of, and reviews Swedish patents relating to, parquet floors. The bibliography (world-wide) is divided into sections on: flooring, general and parquet; treatment; testing, wear; slipperiness; permeability to water.

2288. HARPER, F. C. **Slippery floors in industry.** *Repr.* from *Proceedings of the National Industrial Safety Conference, Scarborough* 1952 (81–92). P.R.

Includes a table of properties of floor finishes (resistance to wear and indentation, slipperiness, warmth, quietness, ease of cleaning, and resistance to deterioration through the action of different chemicals or other products), listing hardwood and softwood flooring.

833.3. Special Uses in Factories and Workplaces

See Nos. 2207–8, 2333, 2375.

833.4. Special Uses in Agricultural Structures

2289. EGGERS, H. W. T. **The use of timber in farm buildings.** *N.Z. J. Agric.* 88 (6), 1954 (609 . . . 614). A.P.B.

Summarizes briefly the National Grading Rules, and presents some notes on the properties of suitable native timbers.

2290. **Plywood grain silos in Canada and the U.S.A.** *Quart. Rev. Timb. Developm. Ass.* 4 (3), 1954 (10–1).

Details of the construction, in ¼-in. exterior-grade Douglas Fir plywood, of silos 34 ft. high × 10 ft. internal diam., illustrated by photographs and a scale elevation drawing.

833.8. Wood in Hydraulic, River and Marine Uses

See also No. 2376.

2291. REECE, P. O. **Structural timber for dock work. I. A review of considerations involved by the extended use of timber for the construction of shed buildings. II. Marine borers and methods of combating them.** *Dock and Harbour Authority, London* 33 (385; 386), 1952 (207–11; 250–4). 12 refs. P.O.

2292. AARON, J. R. **The use of forest produce in sea and river defence in England and Wales.** *For. Rec. For. Comm., Lond.* No. 29, 1954. pp. 24. 13 refs. Price 1*s.* 6*d.*

This survey has shown that timber and other forest products are used in moderate amounts in the construction of sea and river defence works. In the construction of sea defence works, sawn home-grown timber of Oak, Elm, Sweet Chestnut and Beech have given satisfactory service when used for groynes and sheet piling. A significant point brought out by the survey was the extensive use to which round poles can be put in the construction of permeable groynes, which some engineers consider to be superior in performance to the traditional solid groyne. Where solid groynes are used, a considerable economy can be effected by the use of half-round material, which avoids waste in the form of slabwood. Round poles used in sea defence work have the following advantages over sawn material: they are more resistant to abrasion by drift, on account of their streamlined shape and the protection afforded by their bark; and the presence of an outer layer of sapwood ensures that wood preservatives may be freely absorbed when the bark has been removed, should treatment against wood-destroying fungi or marine borers be required.

834. *Shingles. Cooperage. Packing Containers.* (*Manufacture and Use*).

See also Nos. 2105, 2207.

2293. LÁMFALUSSY, S. Hordódongák termelése és a dongakészítés gépesítése. **[Stave production and its mechanization.]** *Erdö* 2 (4), 1953 (369–81, 392–3, 396). [Hu.russ.g.]

Discusses some points connected with the production of staves in Hungary, and the need for mechanization if the industry is to meet increasing demands. The following species can be used for staves: Oak, Chestnut, Robinia, Mulberry and (for beer barrels) *Quercus cerris.* For Tokay wine Sessile Oak from Mt. Sator and region is particularly suitable, having a favourable effect during maturing.

2294. KIREEV, A. A. Opyt ekspluatacii fanernyh trub. **[Use of plywood pipes.]** *Derev. lesohim. Prom.* 3 (10), 1954 (16–7). [Russ.] P.R.

Tabulates (1) the dimensions, working pressure and weight of plywood pipes manufactured since 1950 by a Soviet factory, and (2) some of the uses of plywood pipelines, with indication of pH and temperature, e.g. to convey sand, soil, light clay, SO_2, wood phenols, pulp, flotation residues.

2295. **Defence Specification for the use of Government Departments. DEF-1234. General requirements for packaging supplies for the Services.** H.M. Stationery Office, London. 1954. pp. [72]. Price 3*s.* 6*d.* P.R.

Includes sections on: preservation of timber and plywood, storage of wooden containers, and specifications for preservatives.

2296. **Technical session I [of the 1954 national annual meeting of the Forest Products Research Society]—packaging.** *J. For. Prod. Res. Soc.* 4 (5), 1954 (196–206).

Contains the following papers: Recurrent damage in furniture shipments (*R. E. L. Harmon*); The requirements for good furniture packaging (*J. L. Ware*); Testing furniture packs to insure good delivery (*W. J. Balster*); Handling small parts in pallet boxes (inter- and intra-plant shipping) (*A. Irwin*); and Preservation and packing of automotive vehicles and components for export shipment (*A. D. Peister*).

2297. Internationale Normung von Stapelplatten. ISO-Arbeit. **[International standardization of pallets. Work by the International Organization for Standardization.]** *Holz-Zbl.* 80 (145), 1954 (1712). 1 ref. [G.]

835. *Industrial and Domestic* (*Utility*) *Woodware. Toys and Models. Sports and Recreational Goods. Musical, Scientific and Mathematical Instruments. Surgical Applications etc.*

See also No. 2232.

2298. **[Use of *Acacia* timbers for handles.]** *Rep. For. Comm. N.S.W. 1951/52,* 1954 (15).

Detailed mechanical tests were carried out on wood of *Acacia arundelliana*, *A. penninervis*, and *A. dealbata*. The first two of these are providing valuable timber for tool handles. *Acacia* timbers are of high sp. gr., relatively high yield/acre, easy seasoning and rapid growth.

2299. Kloot, N. H., and Hirst, K. **Diving boards**. *Aust. Timb. J.* 20 (8), 1954 (581, 583, 636 . . 645).

The production of a laminated board in *Pinus radiata* in substitution for Douglas Fir is detailed, the article covering performance required, design, adhesives (only resorcinol, and resorcinol-modified phenol formaldehydes proved suitable as yet), dimensions, shape, making, clamping, testing and final shaping, final treatment and maintenance.

2300. Rehman, M. A., Kishen, J., and Mehra, M. L. **Indian timbers for slate frames**. *Indian For.* 80 (10), 1954 (626–30).

Notes on 21 species.

838. *Vehicles (including Ships, Boats, Aircraft)*

2301. Richardson, H. **Moulded plywood boats**. *Quart. Rev. Timb. Developm. Ass.* 4 (3), 1954 (20–1).

Details of construction (supplied by the Tormentor Yacht Station Ltd.) with 2 skins of cold-moulded $\frac{1}{8}$–in. plywood, suitable for boats up to 20 ft. overall, e.g. the Flying Fifteen and Flying Dutchman classes carrying 160 sq. ft. of sail.

2302. Carlisle, C. H. **Timber in aircraft industry**. *Timb. Tr. J.* 211 (4079), 1954 (1156–7, 1163).

Covers standards required, timbers used for models, wind tunnels, tooling and packing, and an analysis of £30,000 spent by one firm in 1954 on synthetic resin, commercial, and metal-faced plywoods, hardwood, softwood, 1-in. 6V3 Birch plywood and packing timber.

839.1. *Wood Wool and its Manufacture*

2303. **Subject: wood wool (excelsior)**. Question and Answer Service, Office of Technical Services, U.S. Department of Commerce. No. *IR*-11004 [*n.d.*]. pp. 2. P.R.

Definition of wood wool and excelsior, seasoning of logs before conversion to wood wool (or kiln drying of wood wool itself), and an outline of manufacturing lay-out and labour required. [Cf. *For. Abstr.* 10 (No. 1228).]

839.8. *Industrial Waste Wood, its Processing and Uses*

See also Nos. 2215, 2257, 2450 *et seq.*, 2469–70, 2471, 2473.

2304. Sheremet'ev [Šeremetjev], V. S. **Furnaces for accelerated combustion of wood waste**. *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2271, 1954. pp. 8 + 3 dgms. 3 refs. Transl. by M. Slade from *Lesn. Prom.* 13 (8), 1953 (28–31). [See *For. Abstr.* 16 (No. 1051).] Limited distribution. P.R.

2305. Šeršnev, A. A. Sžiganie drevesnyh othodov v pnevmatičeskih topkah CKTI sistemy Šeršneva. **[Burning of wood waste in Seršnev-type CKTI furnaces.]** *Energetik, Moskva* 2 (4), 1954 (26–30). [Russ.russ.] L.S.

The furnace has a W-shaped section. Fuel arrives through a drum feeder at the top of the left-hand arm of the W and is met by a blast of air from the bottom, where there is a grate for large fuel pieces and for kindling. Small particles burn in suspension, and are carried over into the right-hand arm to complete their combustion. With pre-heated air, wood waste with a moisture content of 57–60% can be burned continuously.

2306. Nausch, E. Verwertung von Abfallholz zu Heizzwecken. **[Utilization of wood waste as fuel.]** *Mitt. öst. Ges. Holzforsch.* 6 (4), 1954 (59–62). [G.] P.R.

Illustrated description of the Austrian 'Polda wood gasifier', involving a special perforated cylindrical tube placed vertically on the grate of a sawdust-burning oven.

2307. Davey, C. B. **Decomposition of Hard Maple sawdust by treatment with anhydrous ammonia and inoculaton with *Coprinus ephemerus*.** *Transactions of the Wisconsin Academy of Sciences, Arts and Letters, Madison* 42, 1953 (177–81). 11 refs. L.S.

Properties of sawdust that reduce its value as a fertilizer are: high content of alcohol/benzene solubles, resistance to decay, general poverty in nutrients, high C/N ratio, and fixation of N and other nutrients by organisms involved in the decomposition of cellulose. The aim of this study was to remove or reduce some of these effects by preliminary chemical and microbiological treatments. The sawdust was treated with 12 lb. elemental N or 15 lb. anhydrous NH_3 per cu. yd. to remedy the high C/N ratio. NH_3-treated sawdust required $2\frac{1}{2}$ lb. H_3PO_4 (ca. 2 lb. P_2O_5)/cu. yd. in order to bring its reaction to pH 6·5. An application of 50% K_2SO_4 was also made at a rate of 5 lb./cu. yd. sawdust. Fresh treated sawdust was inoculated with *C. ephemerus*. Energetic fermentation ensued which lasted for 5 months and caused drastic changes in the physical make-up of the sawdust, with pronounced melanization and a nearly 700% increase in the ionic exchange capacity.

2308. Davey, C. B., and Wilde, S. A. **Sawdust compost helps tree seedlings grow**. *Rep. Wis. agric. Exp. Sta. 1952/53* Part 1, 1954 (45). (*Bull. Wis. agric. Exp. Sta.* No. 510.)

Acer saccharum sawdust was first treated with anhydrous NH_3, H_3PO_4 and commercial fertilizer salts and then inoculated with wood-rotting fungi. After 6 months' fermentation, the material carried ca. 3 lb. N, 1·5 lb. available P, 5 lb. available K, and a wealth of effective organic matter per cu. yd. Composted sawdust stimulated nursery seedlings to grow as much as 9 times as fast as untreated controls. Applications ranged from 5 to 60 cu. yd./acre. More than 30 cu. yd./acre tended to produce succulent seedlings that might not transplant well; 20 cu. yd./acre would probably be the best rate for Wisconsin forest nursery soils. [Cf. *For. Abstr.* 15 (No. 801).]

2309. VAUGHAN, E. K., ROBERTS, A. N., and MELLENTHIN, W. M. **The influence of Douglas Fir sawdust and certain fertilizer elements on the incidence of red-stele disease of strawberry.** *Phytopathology* 44 (10), 1954 (601–3).

The sawdust, used as a mulch, brought about a significant increase in the incidence of red-stele of strawberry, caused by *Phytophthora fragariae*. When the sawdust was incorporated in the soil, however, there was only a slight increase of disease. Mulching apparently lowers the soil temperature and increases the moisture content. *From authors' summary.*

2310. POSEY, H. G., and MAY, J. T. **Some effects of sawdust mulching of Pine seedlings.** *Leafl. Ala. agric. Exp. Sta.* No. 42, 1954. pp. 4.

Nursery seedbeds of Loblolly and Slash Pine mulched with sawdust [species not stated, but presumably Pine] gave germination as good as that obtained under burlap; soil temperatures were lower than in unmulched beds, and there was less chlorosis among seedlings and a higher % survival at the end of the first growing season.

2311. BELL, G. E., and BROOKS, E. **Log volume and lumber output.** *Timber of Canada* 15 (3), 1954 (26 . . . 29). 5 refs.

Unbarked Pine slabs and edgings under E. Canadian conditions should average 77–80, Spruce and Balsam Fir 73–75 cu. ft./cord, $\frac{1}{3}$ and $\frac{1}{5}$ respectively of these solid volumes being bark. Although solid vol./cord is less than in roundwood these offcuts could provide an important fraction of pulpwood requirements. [Cf. *For. Abstr.* 15 (No. 796).] *From authors' summary.*

2312. ROGER, N. F., KOEPP, W. H., and GRIFFIN, E. L., JR. **Hemlock slabs as a source of pulp and tannin.** *Journal of the American Leather Chemists' Association, Easton, Pa.* 49 (2), 1954 (75–91). 9 refs. P.O.

A test lot of 1-year-old air-dried Hemlock slabs was chipped and separated by screening into 5 fractions, the coarsest of which was discarded. The 3 middle fractions were each segregated on an air-flotation specific-gravity separator yielding wood product, bark product and an intermediate fraction which was refloated. The ultimate bark fractions, when blended with the (unfloated) finest original fraction gave a product which contained ca. 10% tannin, and included ca. 92% of total bark.

84. PRESERVATION AND OTHER TREATMENTS TO IMPROVE THE PROPERTIES OF WOOD. DAMAGE BY BIOLOGICAL AGENCIES AND ITS CONTROL. SEASONING. TIMBERYARD PRACTICE

841. *Wood Preservation*

See also Nos. 1806, 2207, 2240, 2254–5, 2295–6, 2353, 2355, 2364–5, 2369, 2373, 2379, 2385, 2460, 2472.

2313. RICHARDSON, N. A. **Wood preservation.** *Proceedings of the Institution of Civil Engineers, London (Part I)* 2 (6), 1953 (649–78 + 8 photos). 2 refs. P.O.

A general paper, giving basic information on the causes of damage to wood, the preservatives in use, and different methods of application, with discussion.

2314. *Jahresberichte über Holzschutz. 1951/52.* **[*Annual reports on wood protection, 1951/52.*]** Springer-Verlag, Reichpietschufer 20, Berlin, W.35. 1954. pp. 294. [G.E.] X.

Continuation of 'Kinbergs-Jahresberichte'. The volume contains 792 abstracts, and author and subject indexes.

2315. **Seventh conference of forest products research officers [April, 1954].** *Aust. Timb. J.* 20 (8), 1954 (626 . . . 636). 2 refs.

Contains the following items: (1) Preservation of fence posts: fresh felled, barked *Eucalyptus maculata* posts placed upright in a 10% solution of copperized chromated $ZnCl_2$ took up in 1–3 days 1 lb. of the salt per cu. ft. of sapwood, the desired amount. (2) Health hazards from the use of NaF in timber preservation : it was agreed with health authorities that maximum danger would occur during the sanding of plywood. The wood dust in the air of 2 factories was found to be 25–44 mg./cu.m. With this dust containing 0·1% fluoride, the danger level would be 500 g./cu.m. (3) Durability of blood albumen glues: mixtures of lactic or hydrochloric casein and whole blood showed excellent adhesion in cold-setting mixes and no deterioration in 7-ply panels kept indoors for 14 months. (4) Durability of phenolic-film-glued plywood using NaF-treated veneers: from tests, using *Schizomeria ovata* veneers, immunized against *Lyctus* by momentary dipping, it would be reasonable to assume that with a 0·4% NaF content, satisfactory plywood, both waterproof and (in contrast to the use of boron) reliable in strength properties, can be made. (5) Fumigation of timber: field sterilization of 80-ft. *Syncarpia laurifolia* poles under large polyvinyl covers at the rate of 2 lb. MeBr/1000 cu. ft. for 24 hours resulted in a complete kill of barkbeetles. Work is being extended with other fumigants to cover long immunization as well as sterilization.

2316. GIESEKING, E. Der Stand der Holzschutznormung. Aufwandbasis oder Leistungsbasis? **[State of standardization in wood preservation. Quantity used versus efficacy attained.]** *Repr.* from Koch, H., *Erkenntnisse der Bauforschung und Baunormung*. Commerzia-Verlag G.m.b.H., Berlin. [*n.d.*]. pp. 2. [G.] P.R.

2317. BENOIT, J. La préservation des bois de nos territoires d'outre-mer. **[Preservative treatment of timbers from French overseas territories.]** *Bois For. Trop.* Nos. 36–37, 1954 (29–39; 46–57). [F.f.e. span.]

A review of current methods of preservative treatment.

2318. HATTORI, M. **Wood preservation in Japan.** *J. For. Prod. Res. Soc.* 4 (4), 1954 (46*A*–49*A*).

A brief history and statistics of wood preserving in Japan, with particulars of species and categories treated, preservatives used, and research institutes studying wood preservation.

2319. RENNERFELT, E. Prüfung der pilzwidrigen Wirksamkeit von Holzschutzmitteln mit verschiedenen Laboratoriumsverfahren. **[Different laboratory methods of testing the antifungal effect of wood preservatives.]** *Holz Roh- u. Werkstoff* 12 (8), 1954 (304–6). 8 refs. [G.g.] P.R.

Examination (test tubes, agar) of 6 different coal-tar oils showed that their toxicity toward different fungi was by no means identical, and the correlation of toxicity with phenol content was only partial. New salt preservatives containing oxides as active ingredients were more toxic in agar than Boliden salt. Earth-block tests require more tar oil than the standard DIN 52176.

2320. MCNEIL, D. **Creosote as a wood preservative.** *Wood* 19 (10), 1954 (411–4). 8 refs.

The composition of creosotes and the contributions of their fractions to toxicity against named species of fungi (4), insects (3), and marine organisms generally, are discussed. Quantitative data for the fungi are derived from standard Kolle flask, agar-wood tests.

2321. SMITH, D. N. **Field tests on wood preservatives used for pressure treatment.** *Bull. For. Prod. Res., Lond.* No. 32, 1954. pp. 52 + 1 photo. Price 2*s.* 6*d.*

About 20 preservatives are now under 'graveyard' test, including high- and low-temperature creosotes, creosote/fuel-oil mixtures, and several water-soluble salt mixtures. Results to date, covering the period 1929–1953 are given. So far the high-temperature creosotes have proved the most effective. *From author's summary.*

2322. CARR, D. R. **A note on the leaching of some water soluble preservatives.** *For. Prod. Res. Notes N.Z. For. Serv.* 1 (5), 1954 (41–7). 4 refs.

The leaching of both H_3BO_3 and $H_3BO_3/Na_2Cr_2O_7$ mixtures from pressure-impregnated Radiata Pine blocks is described. For comparative purposes blocks taken from Radiata Pine and Tawa (*Beilschmiedia tawa*) boards treated in commercial pressure-impregnation and diffusion-impregnation plants with H_3BO_3, fluor-chrome-arsenate-phenol (Tanalith), acid-copper-chromate (Celcure), and chromated-zinc-arsenate (Boliden Salt, quality B.I.S.) were used. Results from the limited number of tests carried out do not show as high a degree of fixation in Radiata Pine as Indian workers obtained with Chir (*Pinus longifolia*) and Sal (*Shorea robusta*). *From author's summary.*

2323. BOLIDENS GRUVAKTIEBOLAG. Agents de conservation du bois. **[Wood preservatives.]** *French Patent* No. 1,041,309, Oct. 22, 1953. pp. 6. [F.] P.O.

Different combinations of compounds of 5-valent As, 6-valent Cr, and Zn and/or Cu, in aqueous solution.

2324. HICKSON'S TIMBER IMPREGNATION COMPANY (G.B.) LTD. Holzkonservierungsmittel. **[Wood preservatives.]** *Austrian Patent* No. 174,203, March 10, 1953. pp. 2. [G.] P.O.

The preservative consists of an arylarsonic acid $RAsO(OH)_2$ or its salt (where R is a nitrated or chlorinated benzene, toluene or naphthalene ring) and of alkali or NH_4 chromates (dichromates), fluorides, and arsenates.

2325. GUITON, J.-R. Produits de conservation des bois. **[Wood preservatives.]** *French Patent* No. 1,042,371, Oct. 30, 1953. pp. 2. [F.] P.O.

The preservatives contain roughly (1) 34% (by weight) NaF, 41% $Na_2Cr_2O_7$ and 25% Na 'bi-arsenate', or (2) 63% NaF and 37% $Na_2Cr_2O_7$, and can be applied by any conventional method.

2326. HADERT, H. Wässrige farbige Holzschutzmittel. **[Aqueous coloured wood preservatives.]** *Seifen-Öle-Fette-Wachse, Augsburg* 80 (1), 1954 (16). [G.] P.O.

A preservative of this type is prepared, e.g. from 74 kg. acetic (pyroligneous) acid, 4 kg. NaF or Na_2SiF_6, 4 kg. $Na_2Cr_2O_7$ or $K_2Cr_2O_7$, 15 kg. Fe metal and 3 kg. MnO_2. The solution can be applied by any conventional method.

2327. DAIMLER, K. and PAQUIN, M. (to Farbwerke Höchst). Holzschutzmittel. **[Wood preservatives.]** *German Patent* No. 872,864, April 9, 1953. pp. 3. 3 refs. [G.] P.O.

Wood preservatives said to be particularly suited to prevention of termite and *Hylotrupes bajulus* attack, consist of fluorides (or bifluorides, or mixtures of both) with an addition of NH_4-type fire-proofing agents. These preservatives can be prepared in the form of very concentrated solutions ($\geq 40\%$), and are applied by spraying.

2328. CHEMISCHE FABRIK ISOPYR. Procédé de traitement pour la protection des bois, en particulier des bois de construction. **[Method of preserving wood, in particular building timber.]** *French Patent* No. 1,039,438, Oct. 7, 1953. pp. 3. [F.] P.O.

Wood is treated with a freshly prepared mixture of 3 solutions, containing (1) borax, H_3BO_3 and Hg compounds, (2) benzoic and salicylic acids, and (3) NH_4Br and phenol (with addition of pentachlorophenol), and is then coated with asbestos fibres with a polyvinyl-base binder.

2329. PIGANIOL, P. G. A. (to Soc. An. des Manufactures des Glaces et Produits Chimiques de Saint-Gobain, Chauny & Cirey). Sätt för impregnering eller liknande behandling av trä. **[Method for impregnation or similar treatment of wood.]** *Swedish Patent* No. 134,978, March 26, 1952. pp. 1. [Sw.] P.O.

Halogenated low aliphatic aldehydes (e.g. mono-, di- or triacetaldehyde), preferably in the form of a 15% aqueous solution, are added to wood preservatives as fungicides.

2330. SOCIÉTÉ ANONYME DES MANUFACTURES DES GLACES ET PRODUITS CHIMIQUES DE SAINT-GOBAIN, CHAUNY ET CIREY. Procédé de traitement du bois. **[Method of wood treatment.]** *French Patent* No. 1,012,189, July 7, 1952. pp. 2. [F.] P.O.

Lower aliphatic aldehydes halogenated in the carbon chain are used in aqueous solution as fungicides. In the example quoted the open-tank method is employed.

2331. HEISEL, P., and MULLER, E. (to Farbwerke Hoechst). **Preserving preparations for moist wood.** *Brit. Patent* No. 690,287, May 22, 1950. pp. 3. P.O.

A paste comprising (1) an inorganic and/or organic fungicide, and (2) a highly water-soluble salt (e.g. NaCl or $MgCl_2$), the latter in the proportion of 43–100% of the amount of the former.

2332. PROKOPP, S. Die Imprägnierung schwer tränkbarer Hölzer. **[Impregnation of woods difficult to impregnate.]** *Mitt. öst. Ges. Holzforsch.* 5 (2), 1953 (26–9). 12 refs. [G.] P.R.

A brief survey with bibliography (papers mostly in German).

2333. ELLWOOD, E. L. **High pressure treatment of Eucalypt and other timbers.** *Aust. Timb. J.* 20 (7), 1954 (518, 520).

Gives treatments for *Eucalyptus* sleepers, *E. obliqua* for cooling towers, and for a consignment of Norway Spruce poles from Sweden.

2334. SCHWAGER, H.-W. Das Imprägnieren von Grubenholz mit Schutzsalzen in einer Vakuum-Drucktränkanlage. Betrieb, Erfahrungen und Wirtschaftlichkeit. **[Impregnation of mine timbers with preservative salts in a vacuum-pressure installation. Operation, experience and economic aspect.]** *Bergbau, Essen* 4 (3), 1953 (29–37). 2 refs. [G.g.] L.S.

Illustrated description and technological and economic discussion, of a proposed vacuum-pressure plant for impregnating mine timbers with salt solutions.

2335. RENNERFELT, E. Fäulnisversuche mit nach der Wechseldruckmethode getränktem Holz. **[Decay experiments with wood impregnated by the alternating-pressure method.]** *Holz Roh- u. Werkstoff* 12 (7), 1954 (267–70). 6 refs. [G.g.] P.R.

Samples of Pine sapwood, and Spruce sap- and heartwood, were impregnated with Boliden salts using the alternating-pressure method [cf. *For. Abstr.* 16 (No. 1083)], and the threshold values were then determined for attack by *Coniophora puteana*, *Lentinus lepideus* and *Poria vaporaria*. The results obtained were 0·5–1·5 kg./cu.m. for unleached wood, and values 2–3 times greater for wood leached out. The Leutritz soil-block method was used.

2336. BELLMANN, H. Praxisnahe Laboratoriums-Untersuchungen über das Eindringen von Flüssigkeiten in Holz bei der Kesseldrucktränkung. **[Laboratory tests, in conditions approaching those met in practice, on penetration of liquids into wood during pressure impregnation.]** *Holz Roh- u. Werkstoff* 12 (8), 1954 (312–6). 7 refs. [G.g.] P.R.

Describes and illustrates a new experimental plant which enables industrial-scale impregnation (particularly pressure processes) to be reproduced in the laboratory. It is shown that a moisture content up to 25% has practically no effect on the process of pressure impregnation of Pinewood free from bluestain. Bluestained wood must be dried to a lower m.c.; at ca. 20% m.c., it allows greater penetration than unstained wood. E-θ graphs developed from data on the effect of pressure, duration, and temperature of impregnation, enable the depth of penetration to be estimated from these 3 magnitudes.

2337. CARR, D. R. **A note on pressure impregnation of *Pinus radiata*.** *For. Prod. Res. Notes N.Z. For. Serv.* 1 (5), 1954 (16–20).

Tests were made of the penetration and retention obtained in rough-sawn *Pinus radiata* when treated with water-soluble preservatives at pressures of 115 lb./sq. in. and 180 lb./sq. in. The results indicate that over a pressure period of more than 2 hours, the results obtained at the two pressures do not differ greatly.

2338. HARROW, K. M. **A study of the momentary immersion method for diffusion treatment of *Pinus radiata* with boron compounds.** *N.Z. J. Sci. Technol.* 36*B* (1), 1954 (56–81). 7 refs. P.R.

Preservative treatment of building timbers with B compounds by diffusion is now commercially established in New Zealand. In addition to the methods at present employed, 'steaming and quenching', and hot immersion, a third is now proposed. This consists in the application of concentrated borax/H_3BO_3 solution to the surface of freshly-sawn timber.

A theory proposed by McNabb and Taylor (1953) to explain the distribution of solutes in timber, from diffusion following a momentary immersion treatment, has been tested against data from experiments with *Pinus radiata*. Values for the contents concerned were determined, and close agreement was obtained between observed and calculated concentration gradients of boric acid in *P. radiata*.

Curves showing the distribution of concentration within timber and the rate of increase of concentration at the centre of timber under different conditions, are presented. Examples of treatment schedules for timber, 1 and 2 in. thick, are given. *Author's summary.*

2339. AMEMIYA, S. **[Preservation of wood by the diffusion process. (1) Penetration tests with a few preservatives.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 71, 1954 (137–46). 7 refs. [Jap.e.]

Discs of air-seasoned *Cryptomeria japonica* and *Pinus densiflora* (15–22 cm. diam. × 3–4 cm. thick) and of *Quercus crispula* (5–6·5 × 3) and rods of the first two, respectively 3 × 3 × 10 and 5 × 5 × 7 cm. were injected with water to m.c.'s. of 60–100 and 100–150% and brush-treated (200 g./sq. m. solution or paste) once on radial, tangential or transverse surfaces, with preservatives containing NaF and DNP (dinitrophenol) and with Na PCP (pentachlorophenate). The powders were made up with water 1 : 1, the paste (osmo-plastic) applied direct. Measurement of penetration followed Schulze and Theden [cf. *For. Abstr.* 12 (No. 1365)], NaF and Na PCP being located by reagents and DNP by colour. NaF penetrated to the heartwood in 2 months and along the full length available, but DNP and Na PCP had entered only 3–6 mm. from any surface. Na PCP penetration improved when starch was added to the solution. In radial penetration, long halts at the boundaries of growth rings were unexplained. Lack of uniformity in the m.c. of specimens precluded a comparison of the penetrative power of the 4 preservatives studied. [Tables and illustrations have English legends.] *From author's summary.*

2340. BAVENDAMM, W., and EHLERS, W. Praxisnahe Untersuchungen über die Imprägnierung

von Bauholz durch Streichen und Spritzen. **[Investigation, in conditions similar to practice, on the preservation of building timber [*in situ*] by painting or spraying.]** *Holz Roh- u. Werkstoff* 12 (5), 1954 (183–5). [G.g.]

Tests on roof battens (Spruce and Pine; rough and planed; upright, horizontal or inclined) with water-soluble or oily preservatives (active agents and commercial products) applied by painting or spraying, showed, *inter alia*, that a horizontal rough Pine wood surface absorbs some 50% more preservative (salt solutions and oils) than Spruce in the same condition. Absorption in upright or inclined positions is some 40% less than in the horizontal and > 40% less for planed than for rough surfaces. Only very small penetration depths (up to 7 mm. in special cases, but often less than 1 mm.) were recorded. Sparingly soluble salts are uneconomic if painted or sprayed.

2341. LANG, K. F. Grossversuche des Westeuropäischen Instituts für Holzimprägnierung. **[Large-scale trials at the Western-Europe Institute for Wood Impregnation.]** *Holz Roh- u. Werkstoff* 12 (8), 1954 (308–12). [G.] P.R.

Working programme for a fundamental investigation to be carried out by 12 W. European states on railway sleepers and poles.

2342. JONAS, G.-Z. Über die Vermeidung des Austretens von Steinkohlenteeröl aus imprägnierten Leitungsmasten. **[Preventing the bleeding of coal-tar oil from impregnated transmission poles.]** *Holz Roh- u. Werkstoff* 12 (8), 1954 (316–9). 8 refs. [G.g.] P.R.

Following laboratory tests, log sections were impregnated in a pilot plant and directly treated with steam at 120° C. for 30–70 min. Higher temperatures could be obtained by using hydrocarbons as steaming agents. Results were so encouraging that large-scale application of this procedure was planned. The impregnated poles bled, however, in the spring thaw with strong insolation. A new series of tests, at temperatures of ca. — 10° C., has not yet been completed.

2343. THOMAS, A. V., and JACKSON, W. F. **Durability of treated wooden power-line poles.** *Malay. Forester* 17 (4), 1954 (210).

Forty-three power-line poles, 30 ft. high and 6 × 6 in. section, were erected in 1933 after butt treatment by open-tank process with a 50/50 creosote/diesel-oil mixture. Absorption was probably poor. Some of the poles were in swampy ground favourable to decay, and others in areas where termites were active. They have been examined every 6 months since they were erected, except for 2½ years during the war. Before the war, at the time of inspection, a small quantity of creosote was poured round the base of the poles, and more recently they have been given an occasional brush with a creosote/diesel-oil mixture. In Feb. 1954, 21 years after erection, average service life in years was as follows: Chengal [*Balanocarpus heimii*] 16½, Merbau [*Intsia palembanica*] 16, Keruing [*Dipterocarpus* spp.] 14, Kempas [*Koompassia malaccensis*] 16½, and Light Red Meranti [*Shorea* spp.] 12.

2344. CARR, D. R. **Service testing of creosoted Rimu poles.** *For. Prod. Res. Notes N.Z. For. Serv.* 1 (5), 1954 (21–35).

It is difficult to achieve penetration of Rimu (*Dacrydium cupressinum*) poles with preservative fluid, particularly in the radial direction, except by pressure impregnation. Incising the surface of the poles overcomes this difficulty, so that Rimu poles can be effectively preserved by the open-tank 'hot-and-cold-bath' process. Coal-tar creosote produced in New Zealand was tested under actual service conditions and found to be an efficient wood preservative. The necessity for thorough seasoning prior to preservative treatment was also demonstrated. After more than 20 years' exposure, the results obtained indicate that a life of more than 30 years may be expected from the preserved poles, compared with an average life of 4 years obtained from untreated controls. The cross-arms on the test poles have been held in perfect alignment during service. Maintenance has been negligible. *Author's summary.*

2345. CARR, D. R. **Service testing of creosoted fence posts.** *For. Prod. Res Notes N.Z. For. Serv.* 1 (5), 1954 (36–40).

Service tests of native and introduced conifers and hardwoods show that heavy butt treatments combined with light top treatments are effective for 10–12 years only. A full-length hot-and-cold-bath treatment was found to be effective for 25 years.

2346. MOGLIA, P. J. **Portable treating plant for fence posts.** *For. Prod. News Lett. C.S.I.R.O., Aust.* No. 200, 1954 (2–3).

Describes a unit suitable for demonstrating low-pressure soaking (10 lb./sq. in., sufficient for treatment of sapwood in most species) with a capacity of 50 posts, 3–5 in. diam. Pressure is got by placing a 44-gal. drum 20 ft. up, e.g. in a tree. This head completes the treatment of Eucalypts in 24 and of Radiata Pine in a few hours.

2347. CARR, D. R. **The air-drying and pressure-impregnation of New Zealand-grown Larch (*Larix decidua*), Douglas Fir (*Pseudotsuga taxifolia*) and Corsican Pine (*Pinus laricio*) natural round fence posts.** *Repr.* from *N.Z. J. Sci. Technol.* 35*B* (6), 1954 (481–97). (*Tech. Pap. N.Z. For. Serv.* No.2.)

The construction and operation of the experimental pressure-impregnation plant installed by the New Zealand Forest Service at Rotorua is described. The results of investigations on the effects of temperature, initial air pressures, and oil pressures, on the penetration of coal-tar creosote into Larch, Douglas Fir, and Corsican Pine are reported. The heartwood of Larch and Douglas Fir is generally very difficult to penetrate with liquids applied under pressures, but their sapwood is less difficult. Sapwood depth and distribution in natural round New-Zealand-grown Larch and Douglas Fir posts were examined. Successful utilization of the three species referred to is not entirely a function of preservative treatment, but also depends on correct handling and drying before preservative treatment. The rate

of air-drying of fence posts of the three species was also investigated. *From author's summary.*

2348. RENNERFELT, E. Träskyddskommittens fält- och rötkammarförsök med olika träimpregneringsmedel. Redogörelse nr. III. **[The wood preservation committee's field and decay chamber experiments. Report No. III.]** *Medd. Skogsforskn-Inst., Stockh.* 44 (9), 1954. pp. 36. 10 refs. [Sw.E.sw.e.] Price *Kr.*3.

A further report [cf. *For. Abstr.* 13 (No. 1639)] on field tests now 10 years old. Creosote oil has given absolutely the best results, and Boliden salt the best results of the salt preservatives tested. Stakes in arable ground decay more rapidly than those in sand, but posts rot at about the same rate in all plots. In the mine the impregnated timber still shows only negligible damage. Results after 5 years show that stakes and posts treated with K 33 (a salt containing oxides of As, Cr and Cu) and exposed in the test plots, are undamaged except for a few stakes treated with the lowest quantities of the salt. Immersion in tar oils of stakes and posts treated with Boliden salts has increased their resistance to decay. Höganäs and creosote oils give approximately the same protection to treated wood; decay is more rapid in a greenhouse than in test plots.

2349. NEUBAUER, L. W., and GRAH, R. F. **Absorption rates of 'penta' by various species of wood.** *Agricultural Engineering, St. Joseph, Mich.* 34 (8), 1953 (534–7, 544). L.S.

Presents, in graphs and a table, the results of tests made in California on fence-posts to determine the rates and amounts of absorption of pentachlorophenol in diesel oil, using different soaking methods. A wide range of absorption rates has been shown to exist for different species. The sapwood of hardwoods usually absorbs the impregnant more rapidly than that of conifers, although some conifers have a high rate of absorption. Incising increases absorption, but vigorous incising can damage posts. End coating usually reduces the amount of absorption. Absorption rate is always high at the beginning, decreasing with time according to a parabolic curve of the type $A = C_1 + C_2H^n$, where A = absorption in lb./cu. ft., H = time (hours), and C_1, C_2 and n are constants. Resin coating on some posts, due to barking when green, may greatly reduce the rate of absorption.

2350. BIENFAIT, J. L., and HOF, T. Feldversuche mit verschiedenen Holzschutzmitteln im Holzinstitut T.N.O. Delft (Niederlande). **[Field trials with different wood preservatives at the T.N.O. Wood [Research] Institute, Delft (Netherlands).]** *Holz Roh- u. Werkstoff* 12 (8), 1954 (306–8). 1 ref. [G.g.] P.R.

Tabulates provisional results for posts of 4 conifers and 2 broadleaved species impregnated in 1947 with a number of preservatives by different methods.

2351. BLEW, J. O. **Comparison of wood preservatives in stake tests (1954 progress report).** *Rep. U.S. For. Prod. Lab., Madison* No. 1761, 1954. pp. 7. 3 refs. P.R.

Cf. *For. Abstr.* 13 (No. 3407).

842. *Treatments to Improve the Resistance of Wood to Physical and Chemical Agencies other than Fire*

See also Nos. 2207, 2232, 2262.

2352. LISSNER, O., and TOEPEL, T. (to Badische Anilin- und Soda-Fabrik). Verfahren zum Veredeln von Holz. **[Method of improving wood.]** *German Patent* No. 858, 770, Dec. 8, 1952. pp. 3. [G.] P.O.

Impregnation with the products of condensation of polyurethanes and formaldehyde.

2353. BADISCHE ANILIN- UND SODA-FABRIK. Verfahren zur Veredelung von Holz. **[Method of improving wood.]** *Austrian Patent* No. 173,554, Jan. 10, 1953. pp. 3. [G.] P.O.

Supplement to *German Patent* No. 858,770. Fungicides or insecticides (e.g. fluorides or phenols), fireproofing agents, and wetting agents may be added to the synthetic-resin solutions used.

2354. KRZIKALLA, H., and LISSNER, O. (to Badische Anilin- und Soda-Fabrik). Verfahren zum Veredeln von Holz. **[Method of improving wood.]** *German Patent* No. 872,860, April 9, 1953. pp. 3. [G.] P.O.

Wood is treated with aqueous, preferably ammoniacal, solutions of an acid with 6 or more C atoms, particularly products of addition of colophony [rosin] or resinic acids to unsaturated acids, with or without other impregnants. The treatment increases the hardness and mechanical strength of wood, and reduces its swelling and water absorption.

2355. SUGE, K. **[Treatment for lumber.]** *Japanese Patent* No. 6047, Nov. 21, 1953. [Jap.] From *abstr.* in *Chem. Abstr.* 48 (19), 1954 (11787). P.R.

Wood is dehydrated by heating with trichloroethylene containing natural or synthetic resin, fats or oils, or pentachlorophenol, after which the solvent is removed.

2356. KHNDZORIAN-IABLOKOFF, A., DELORD, A., FALINSKI, M., and LAUTIE, R. (to Office National d'Études et de Recherches Aéronautiques). **Process for treating wood and resulting article.** *U.S. Patent* No. 2,674,543, April 6, 1954. pp. 3. 9 refs. P.O.

Wood veneer is treated for 12 hours at 60° C. with a < 10% NaClO solution, which removes ca. 85% of lignin. It is then impregnated with melamine-formaldehyde resin (70% by weight on a wood basis) and heat-cured. The product can be made into plywood by using only slight pressure and heat.

2357. GARD, G. E. (to Armstrong Cork Co.). **Method of impregnating wood.** *U.S. Patent* No. 2,631,109, March 10, 1953. pp. 5 + 4 dgms. 5 refs. P.O.

Wood is heated in an H.F. electrical field below 212° F. After most of the water is removed, the temperature is raised to 250–350° and the wood is immersed in a bath of a melted wax-like material (at ca. 170°), until at least ¼ of impregnant (based on the dry weight of wood) is deposited in the pores. The products are dimensionally stable and resist checking or splitting.

2358. **Two new wood products: compressed wood for compressive strength, reconstituted wood for**

controlled properties. *Materials and Methods, New York* 39 (3), 1954 (145–6). P.O.

Physical properties of Hy-du-lignum and Castwood.

2359. APOSTOL, A. **[Shrinkage of compressed Pine wood.]** *Derev. lesohim. Prom.* 3 (4), 1954. [Russ.] From *abstr.* in *Holz-Zbl.* 80 (111), 1954 (1294). [G.]

It was found that wood compressed radially shows a radial shrinkage 3·06 times as great as the tangential shrinkage, whereas ordinary Pine wood, under identical conditions, has a radial shrinkage value ca. 0·5 of that of tangential shrinkage. The ratio of radial to tangential shrinkage in compressed wood increases with the increase of moisture content (m.c.). In the tangential direction the shrinkage of compressed wood is somewhat less than that of ordinary wood. The coefficient of radial shrinkage in compressed wood increases with the increase of m.c., whereas that of tangential shrinkage remains practically unchanged.

843. *Fireproofing and Fire Resistance*

See also Nos. 2207, 2327, 2353, 2458.

2360. MCMULLEN, M. J. **Methods for testing 'fire-retardant' and 'surface flame-retardant' treated timber and plywood.** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 7 (3), 1953 (16–20).

Describes the selection of test pieces and the Cherry Xylopyre, an apparatus that holds them over a Bunsen flame 1⅜ in. high. Treated wood should not continue to flame or glow when removed from the flame, after exposure to it for a specified period.

2361. CUNNINGHAM, G. L. (to Waterloo Corp.). **Fire retardant coating composition.** *U.S. Patent* No. 2,679,489, May 25, 1954. pp. 3. 1 ref. P.O.

The composition comprises, in an aqueous medium: formaldehyde, urea (100–300% of the formaldehyde content), NH_4 and/or Zn salts of orthophosphates or borates (200–400% of the urea content), a thickening agent (e.g. carboxy methylcellulose) (0·1–5% of total mixture), a finely comminuted inorganic solid (50–150% of the urea content), and hexamethylenetetramine (5–50% of the formaldehyde content).

844. *Attack by Plant Organisms*

2362. BJÖRKMAN, E. Lagringsröta och blånad i skogslagrad massaved. Kortfattad rapport över 1953 års försök rörande uppkomsten av lagringsröta och blånad i vid olika tidpunkter avverkad och på olika sätt skogslagrad tall-, gran-, björk- och aspmassaved. **[Storage decay and bluestain in pulpwood stored in the forest. A brief [progress] report on research in 1953 on the occurrence of storage rot and bluestain in Pine, Spruce, Birch and Aspen pulpwood felled at different seasons and stored in the forest in different ways.]** *Skogen* 41 (22), 1954 (356–7, 363). [Sw.]

2363. NYLINDER, P., and RENNERFELT, E. Undersökningar över rötskador i den helbarkade sulfitveden under olika huggnings- och lagringsförhållanden. **[Investigations on decay damage to completely barked sulphite pulpwood in different felling and storage conditions.]** *Medd. Skogsforskn-Inst., Stockh.* 44 (10), 1954. pp. 122. 22 refs. [Sw.sw.e.] Price *Kr.*7.

The material studied consisted of 10,250 [Spruce] logs (top, middle or butt) cut from trees felled during 7 periods of 1–3 months from April 1945 to March 1946. After barking, the logs were stacked in the forest, moved to log dumps during the winter, and by lorry in May 1946 to Olafsfjord; there they were examined and then stored floating in round booms for 3 months. One-third of the material was then removed and stacked on land until Oct. 1948, and the rest was left in the water, floating either in bundles or end to end with the ends overlapping, until July 1947, after which it was stacked on land. The water-storage and land-storage methods are shown in photographs. Annual-ring breadth, oven-dry density and the relation between the two, and heartwood diameter in relation to annual-ring breadth and the diameter of the cross-section were determined for the material felled at the different seasons. These relationships and the results of measurements showing the distribution and degree of moisture and of fungus attack in logs at different times and in different storage conditions are shown in tables and figures with English legends. Results include the following: (1) *Logs in the round boom*: Very little fungus damage was present after 3 months in the water; in subsequent land storage, damage was less in the middle than in the top and bottom layers of the piles, and there was very little decay in the heartwood. (2) *Logs floating end to end with the ends overlapping*: Decay was more extensive in sections at the water line than in those above or below the water; all logs showed some decay, and after land storage, fungus damage was greatest in logs that had been stored in this manner. (3) *Logs floating in bundles*: Logs at the water line were most decayed, followed in order by those completely above water and those completely submerged, and this still held good after a year's land storage; logs stored in this manner showed on average the least fungus damage. (4) Blue-stain was less pronounced than damage by rot fungi and more difficult to determine quantitatively; it was least apparent in logs stored floating in bundles. (5) Logs cut in September showed the greatest decay and those cut in winter the least; logs cut in August showed significantly less stain than those cut in September. However, it was found that the extent of decay increases on average with increasing ring width and decreasing heartwood amount, and when correlations were made for these factors, the differences between the September-cut and the other material were reduced. The commonest fungus was *Stereum sanguinolentum*, present during the first year, and still important later in storage with *Corticium laeve* and *Peniophora gigantea*. The most important stain fungi were *Ophiostoma piceae* and *Pullularia pullulans*. Laboratory experiments failed to confirm that fast-grown timber is attacked more rapidly than slow-grown timber, but showed that summer-felled timber is more rapidly attacked than winter-felled, that decayed wood takes up and gives off water differently from sound wood and that *Lentinus*

lepideus attacks only cellulose and *S. sanguinolentum* both cellulose and lignin.

844.1. Sap-staining and Mould Fungi

See also Nos. 2336, 2362–3.

2364. LINDGREN, R. M., and WRIGHT, E. **Increased absorptiveness of molded Douglas Fir posts.** *J. For. Prod. Res. Soc.* 4 (4), 1954 (162–4). 2 refs.

Douglas Fir posts were kept continuously sprayed with water between felling and peeling, and were divided into 4 groups: (1) sprayed with a 2% solution of NaF in water; (2) unsprayed controls; (3) sprayed with a 4% solution of an equal mixture of Na pentachlorophenate and borax, and (4) sprayed with an aqueous mixture of 2% NaF and *Trichoderma* spore inoculum, isolated from Southern Pine. All groups were stored in the open for 9 months, (1), (2) and (4) being wrapped in asphalt roofing for the first 7 months to prevent rapid surface drying. These groups were all heavily infected (group (4) the least) and of a greenish colour, while (3) remained uninfected and bright. Other fungi present, mostly on (2), were *Alternaria* sp. and *Ophiostoma* sp. Subsequent average absorption of preservative (equal parts of coal-tar creosote and a light petroleum oil) was 3–5 times greater for the infected than for the bright posts, and similar differences in depth of radial penetration were found. Group (2) showed the greatest and (4) the smallest increase in permeability associated with infection. Microscope studies of the infected wood showed that the fungi had primarily attacked the wood rays and other parenchyma cells, partly or completely obliterating parenchyma tissue and thus creating many open passages in the sapwood. The comparatively low mould growth on (4) may be due to antagonism between the southern strain of inoculum and local strains on Douglas Fir or to possible differences in storage conditions. [Cf. *For. Abstr.* 15 (No. 4260).]

2365. GRAHAM, R. D. **The preservative treatment of Douglas-Fir post sections infected with *Trichoderma* mould.** *J. For. Prod. Res. Soc.* 4 (4), 1954 (164–6).

Douglas-Fir post sections, some infected with *Trichoderma* mould and some free from mould, were treated by soaking, hot-and-cold bath, and pressure processes. Retention of the preservative generally was twice as great on moulded posts, and penetration was deeper and more uniform. *From author's summary.*

2366. BAVENDAMM, W. Pflanzliche Holzschädlinge. Bläuepilze. **[Plant pests of wood. Bluestain fungi.]** *Holz Roh- u. Werkstoff* 12 (5), 1954 (205–8). 17 refs. [G.] P.R.

2367. DAVIDSON, R. W. **Species of Ophiostomataceae associated with Engelmann Spruce bark beetle.** *Abstr.* in *Phytopathology* 44 (9), 1954 (485).

Four species were found in Colorado in association with *Dendroctonus engelmannii*. A *Leptographium* sp. is the most conspicuous and consistent associate of the beetle, causing a grey sapwood stain. *Endoconidiophora coerulescens* is sometimes present in galleries, and two *Ophiostoma* spp. have been isolated from galleries or from adult beetles. The role of these fungi in the life cycle of *D. engelmannii* is not known but they may have important effects on the trees and beetles after attack or in the development of broods.

2368. DAVIDSON, R. W., and LOMBARD, F. **Brick red stain of Sitka Spruce and other wood substrata.** *Phytopathology* 44 (10), 1954 (606–7).

A fungus causing stains ranging from pink to cinnamon brown has been isolated at various times from Sitka Spruce, White Pine, Douglas Fir and Red Oak, and in logs of Sitka Spruce, was found to have penetrated into the heartwood. The name *Ascocybe grovesii* (new genus and species) has been assigned to this fungus, which presents some unusual characteristics.

2369. ORMAN, H. R. **The relative efficacy of certain chemical dip treatments in preventing sapstain in *Pinus radiata*.** *For. Prod. Res. Notes N.Z. For. Serv.* 1 (5), 1954 (1–15). 9 refs.

The relative efficacy of 9 different dip treatments in preventing sapstain in block-stacked green *Pinus radiata* boards was examined. Test stacks were erected throughout the year and the varying degree of staining with season was investigated. Solutions containing Na pentachlorophenate, in mixtures with borax, or with borax and ethyl mercuric chloride or with Na trichlorophenate, gave the best protection when the green timber was block-stacked for periods of 3 months or more. The degree of staining was found to be at a minimum during the cold winter months. *From author's summary.*

844.2. Wood-destroying Fungi

See also Nos. 1903–11, 2362–3.

2370. ROOSEN, P. Contribution à l'étude de la durabilité naturelle des bois du Congo. **[Natural durability of [some] Congo timbers.]** *Bull. Inform. Inst. nat. Étude agron. Congo belge* 3 (3), 1954 (147–58). [F.]

Forty-three timbers are classified by % loss in weight after standard exposure to 4 species of fungi.

2371. REE, W. VAN. **Laboratory tests on durability with wood-rotting fungi.** *Commun. For. Res. Inst., Bogor* No. 44, 1954. 29 refs. [E.] (*Repr.* from *Tectona* 43, 1953 (37–58).)

Discusses and describes durability tests on some 20 Indonesian species with tropical fungi in the laboratory, with particular reference to the modifications necessary in using the Leutritz soil-contact method under tropical conditions. Sedziak's adaptation of the Leutritz method [cf. *For. Abstr.* 11 (No. 3061)], which involves burying all but a small corner of the test block, obviates the chief trouble due to tropical conditions, namely infestation of test blocks with mites. The importance of standardizing test conditions for the tropics is stressed. The 20 species investigated are tentatively placed in durability classes as a result of these preliminary experiments.

2372. APLIN, T. E. H., and COSTA, E. W. B. DA. **Project P.13. The natural durability of timber. Subproject P.13–10. Development of techniques for laboratory decay-resistance testing. Progress report**

No. 1. The effect of jar aeration on the rate of decay in accelerated decay tests. Division of Forest Products, C.S.I.R.O., Melbourne. 1954. pp. 10 + 6 photos. P.R.

With *Trametes lilacino-gilva* there was less decay in jars with polythene caps or with tight unlined metal screw caps than in jars with loose caps. *Coniophora cerebella* was less sensitive to aeration.

2373. MATEUS, T. J. E. Caracterização dos preservativos para madeiras por um novo método baseado na medição de flechas. **[Evaluation of wood preservatives by a new method based on measurements of deflection.]** *Publicação, Laboratório Nacional de Engenharia Civil, Lisboa* No. 48, 1954. pp. 38. 18 refs. [Port.port.e.f.g.] P.R.

Wood specimens exposed to attack by fungi (*Polystictus versicolor*, *Poria vaporaria* and *Coniophora cerebella*) showed marked increases with time in deflection under a constant static load, while deflection values for undecayed controls remained comparatively constant. A method is described of estimating variations in amount of deflection of test specimens subjected to a load of known magnitude as a measure of the amount of decay present and its progress. A comparison with results from the more usual method of measuring decay by loss of weight demonstrates the greater sensitivity of the deflection method. By the deflection test also the progress of fungus attack in the specimen can be followed and information about the effectiveness of preservatives can be speedily collected.

2374. BURO, A. Untersuchungen über den Abbau von Kiefern- und Buchenholz durch holzzerstörende Pilze und deren Einfluss auf einige physikalische Eigenschaften des Holzes. **[Investigations on the decay of Pine and Beech wood by wood-destroying fungi and their effect on some physical properties of the wood.]** *Holz Roh- u. Werkstoff* 12 (7), 1954 (258–67). 25 refs. [G.g.] P.R.

The tests were made with sound Pine sapwood free from bluestain and Beech without any sign of superficial damage or incipient decay. The fungi used were *Coniophora cerebella* (for both woods), *Lentinus lepideus* (Pine) and *Polystictus versicolor* (Beech). *C. cerebella* and *P. versicolor* caused a weight loss that was rapid from the start, increased slowly during the first 5 weeks, then fell off rapidly later; *L. lepideus* showed both a rapid increase and a decrease, with a peak rate after 5 weeks. During decay, Pine shrank, whereas Beech first swelled then later shrank. The dimensional changes were anisotropic for both species. Brown-rot fungi caused a marked shrinkage along the fibres when the weight loss exceeded 40%; this was associated with an increase of swelling capacity in the same direction. Sorption data, obtained from test pieces at different stages of decay, were analysed; the reduction of chemical sorption points to degradation of carbohydrates, and the rise in capillary condensation to an increase of the capillary properties of the cell wall. It was found that *Polystictus* decomposes substances inside the cell wall. The following formula is proposed: $Q_a = Q_n \times S_p \times Q_i \times (100-G_v)/100 \times S_n$, where Q_a is the external, and Q_i, the internal swelling of the decayed wood (in %); S_p, its sorption (in %); G_v, the weight loss (in %); Q_n, the external swelling and S_n, the sorption of the sound wood (both in %); this formula gave a good agreement with experimental data obtained. Investigation into the internal swelling showed that the individual micelle did not decay uniformly and that the number of the large capillaries in the cell wall increased with increasing decay. Polarized light showed considerable destruction of rays and early wood in Pine. The anisotropy of swelling persisted when all rays were destroyed.

2375. FINDLAY, W. P. K., and SAVORY, J. G. Moderfäule. Die Zersetzung von Holz durch niedere Pilze. **[Soft rot. Wood decay caused by lower fungi.]** *Holz Roh- u. Werkstoff* 12 (8), 1954 (293–6). 3 refs. [G.g.] P.R.

Laboratory tests have shown the soft rot occurring in cooling towers to be caused by the following fungi: *Chaetomium* (in particular *C. globosum*), *Trichurus terrophilus*, *Bispora effusa*, and some *Stysanus*, *Stemphylium* and *Coniothyrium* species. It has been found that for *C. globosum*, the attack (measured as weight loss after 6 weeks) increased as the concentration of the nutrient salt solution increased. The soft rot is characterized by penetration of hyphae into the secondary wall, but not into the middle lamella, decay being particularly significant in the thick-walled late-wood elements. Cu-containing chemicals afford some protection.

2376. WILSON, I. M. ***Ceriosporopsis halima* Linder and *Ceriosporopsis cambrensis* sp. nov.: two marine Pyrenomycetes on wood.** *Trans. Brit. mycol. Soc.* 37 (3), 1954 (272–85). 8 refs. O.B.D.

Found on the west coast of Wales on wood immersed in the sea. In the succession of fungi on wood thus immersed these two species generally follow *Halophiobolus opacus* and may in turn be followed by other fungi. If the wood is situated in the intertidal region near the low water mark, the fungi facilitate the entrance of the more destructive boring crustaceans. *From author's summary.*

2377. HIGUCHI, T. **Biochemical study of wood-rotting fungi. (3) '*In vitro*' experiment of Bavendamm's reaction by using α-naphthol reagent.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2329, 1954. pp. 4 + 1 dgm. + 1 gph. 4 refs. Transl. from *J. Jap. For. Soc.* 36 (1), 1954 (22–4). [See *For. Abstr.* 15 (No. 2997).] Limited distribution. P.R.

2378. MOIR, G. F. J., and RALPH, B. J. **A new metabolite of *Polyporus tumulosus* Cooke.** *Chem. & Ind.* 1954 (37), (1143). 2 refs. P.R.

A substance identical with 2 : 5-dihydroxyphenylglycoxylic acid has been isolated by fractionation of the mixed metabolic products from a glycerol-based medium.

2379. ZABEL, R. A. **Variations in preservative tolerance of wood-destroying fungi.** *J. For. Prod. Res. Soc.* 4 (4), 1954 (166–9). 13 refs.

A brief review of data on such fungi showing resistance to various preservatives is presented. Information [from experiments] on the approximate preservative threshold retentions and differences in resistance exhibited by *Lenzites trabea*, *Poria monticola* and *Lentinus lepideus* to pentachlorophenate,

Cu naphthenate, phenyl mercury oleate and creosote is presented. These data indicate striking differences between fungi in preservative resistance. Implications of these differences in resistance on the evaluation of preservatives and in decay control are discussed. *From author's summary.*

2380. SKUPIENSKI, F. X. Action antagoniste de *Penicillium* sp. sur le développement de certains champignons destructeurs du bois. I. Note préliminaire. [**Antagonistic effect of *Penicillium* sp. on the development of some wood-destroying fungi. I. Preliminary communication.**] *Repr.* from *Bulletin de la Société des Sciences et des Lettres de Lodz, Classe III de Sciences mathématiques et naturelles* 4 (14), 1953. pp. 4. [F.f.] P.R.

Culture tests in Kolle flasks on malt-agar showed that the *Penicillium* sp. used had antibiotic properties with regard to (*a*) *Lentinus lepideus*, (*b*) *Poria vaillantii* and (*c*) *Merulius lacrymans*. The mycelium of (*a*) stopped growing when relatively distant from the *Penicillium*; that of (*b*) makes contact, but does not penetrate further, while (*c*) grows over the *Penicillium*, forming thin rhizomorphs, its development being, however, inhibited. On the other hand, the fungi, especially (*a*) act antagonistically towards the *Penicillium*. [Cf. *For. Abstr.* 15 (No. 2267).]

2381. WÜNSCHE, M. Schwamm im Haus. Vorbeugung und sichere Bekämpfung. [**Dry rot in houses. Prevention and control.**] Druckhaus Tempelhof, Berlin. 1952. pp. 180 + 21 photos. [G.] P.R.

Includes sections on: biology of fungi; identification of fungi and determination of the age of dry rot; danger of infection; damage appraisal; chemical preservation of woodwork and masonry; preventive measures; control of dry rot and other fungi, and legal questions.

2382. STEINIGER, F. Hausschwamm und Gesundheitsgefahren. [**Dry rot and danger to health.**] *Holztechnik* 34 (9), 1954 (426–7). [G.] P.R.

Health danger due to dry rot itself is almost insignificant compared with that caused by chemicals used to control dry rot.

845. *Attack by Animals*

See also No. 1944.

845.1. Marine Borers

See Nos. 2017, 2291.

845.2. Terrestrial Borers

See also No. 2315.

2383. FISHER, R. C. **Some problems in forest-products entomology.** *Report, 6th Commonwealth Entomological Conference, London* 1954 (117–22).

Notes on problems connected with ambrosia beetles, woodwasps, Bostrychidae, Lyctidae and Anobiidae, and on the research in progress at the Forest Products Research Laboratory, Princes Risborough.

2384. SNYDER, T. E. **Two borers of unusual habits.** *Pest Control* 22 (9), 1954 (30 . . . 34). D.S.I.R.

Describes *Nacerdes melanura* and *Micromalthus debilis*, which recently caused considerable damage to the piling under foundations in a part of Milwaukee, Wis.

2385. BECKER, G. Beiträge zur Prüfung und Beurteilung öliger Hausbockbekämpfungsmittel. [**The testing and appraisal of oily preparations for the control of *Hylotrupes bajulus*.**] *Holz Roh- u. Werkstoff* 12 (5), 1954 (173–82). 28 refs. [G.g.] P.R.

Discusses the possibility of making full use of the very efficient oily contact insecticides developed for the control of *H. bajulus*, since 1945, and presents the results of various tests with a number of these (mostly unspecified). The efficacy of respiratory insecticides is found to show no relationship to their volatility. The capillary rise of oily insecticides in the frass is greater when their viscosity is smaller; the effect of surface tension is of secondary value. The depth of penetration of oil coatings applied by a brush depends on the amount of oil used, being generally 4–5 and 6–8 mm. for coatings of 250 and 500 g./sq. m., respectively; it is not always correlated with the capillary rise in frass. High toxicity, and depth of penetration in wood are less important factors than the oil's capacity to penetrate via frass in tunnels.

2386. **Timber borers [:*Pachycotes ventralis*].** *Rep. Cawthron Inst. 1953/54*, 1954 (40).

P. ventralis has attacked *Pinus radiata* both freshly cut and in stacks when the butts of the boards stood on the ground. To determine development in different conditions, sets of timber were: (1) covered with sacks and exposed to weather, (2) left uncovered and exposed to weather, and (3) stored in the dry. Eggs were laid in all sets when moisture contents were high. Eggs developed and the insect completed its cycle in (1) and (2) in timber close to the ground but not in other parts were it had dried out. The insect failed to complete its development in (3) after the timber had dried out.

845.3. Termites

2387. HARRIS, W. V. **Developments in termite research.** *Report, 6th Commonwealth Entomological Conference, London* 1954 (126–32).

Notes on research to date, with particular reference to the work of the Termite Research Unit in East Africa.

2388. SNYDER, T. E. **Detection of termites by microphones.** *Pest Control* 22 (7), 1954 (33–4). 4 refs. D.S.I.R.

Describes several instruments involving the use of microphones, with and without amplifiers, designed and made during the last 25 years.

2389. WEIDNER, H. Grundsätzliches zur Termitenbekämpfung in Hamburg-Altona. [**The main lines of termite control operations in Altona, Hamburg.**] *Anz. Schädlingsk.* 27 (11), 1954 (170–2). [G.]

A report on measures taken to free buildings in Hamburg from termite infestation. It was necessary to dismantle and burn infested structural timbers, at the same time taking precautions to prevent the

migration of colonies. [Cf. *For. Abstr.* 14 (No. 3904).]

2390. **Malaya. Résumé of entomological work, 1946–1953.** *Report, 6th Commonwealth Entomological Conference, London* 1954 (258–80).

Includes a summary of investigations into the control of termites in buildings, and recommendations for precautionary and control measures.

2391. JACKSON, W. F. **Report of a further series of laboratory tests to determine the resistance to termite attack of certain Malayan commercial timbers.** *Malay. Forester* 17 (4), 1954 (207–8).

Further tests with *Coptotermes acinaciformis* confirmed those with the less voracious *C. lacteus* and *Nasutitermes exitiosus* [cf. *For. Abstr.* 14 (No. 2832)] that *Madhuca utilis* and *Palaquium maingayi* may be classed as highly resistant.

2392. ST. GEORGE, R. A. **How effective is chlordane as a termite soil poison?** *Pest Control* 22 (8), 1954 (24, 26). D.S.I.R.

American No. 2 fuel oil with 1 or 2% chlordane, and 2% chlordane in water emulsion, applied at rates of ½ and 1 pint/sq. ft. of soil surface, gave good control of termites for 5 years on the Gulf Coast.

2393. WOLCOTT, G. N. **Termite damage and control as factors in the utilization of timber in the Caribbean area.** *Journal of Agriculture of the University of Puerto Rico* 38 (2), 1954 (115–22). 3 refs. [E.e.span.] P.R.

A survey of data on the biology and destructive ability of *Nasutitermes costalis, Heterotermes tenuis* and *Cryptotermes brevis*, of which the first causes much less economic damage than the other two. Methods of control are discussed. Chlordane, aldrin and dieldrin are very efficient in killing termites; impregnation of susceptible woods with pentachlorophenol or its Na salt prevents attack as long as the surface protection is unbroken. Growing of termite-resistant woods such as *Swietenia mahagoni, Ocotea rodiaei* or *Tectona grandis* is recommended for the Caribbean.

2394. MATEUS, T. J. E., and GOES, E. S. R. Sobre uma termite das madeiras secas (*Cryptotermes brevis* Walker). Biologia da especie. Prejuizos causados no Funchal. Meios de defesa dos madeiramentos das construções. [**A dry-wood termite (*C. brevis*). Biology of the species. Damage done at Funchal. Methods of protecting structural timber.**] *Publicação, Laboratório Nacional de Engenharia Civil, Lisboa* No. 44, 1953. pp. 56. 13 refs. [Port.port.] P.R.

The insect was introduced to Madeira from tropical America and became a menace in Funchal, up to an altitude of 200 m. Pentachlorophenol (or its Cu and Zn salt), DDT, and other products can be used as preservatives, and outbreaks controlled with DDT and BHC.

2395. VILLEGAS G., H. El *Kalotermes brevis* Walker y la resistencia comparativa de algunas maderas colombianas a su ataque. [***Cryptotermes brevis* and the comparative resistance of some Colombian timbers to its attack.**] *Acta agronómica, Palmira* 4 (2), 1954 (89–126). 34 refs. [Span.span.e.] C.G.B.

Presents (1) a review of literature on termites in general and their control; (2) notes on the life history of *C. brevis*; (3) brief descriptions of the most important Colombian timbers and their properties; and (4) a report on tests of the comparative resistance of these timbers to *C. brevis*, with a classified list. The most resistant species are *Bambusa angustifolia, Quercus colombiana, Juglans cinerea, Aniba perutilis* and *Panopsis* sp. The age of the tree, the zone of the stem from which the specimen is taken and its chemical composition, all play a part in determining resistance to attack.

2396. SCHMIDT, H. Formen des Termitenangriffes an Furnier-, Span- und Faserplatten. [**Forms of termite attack on plywood, chipboards and fibreboards.**] *Holz Roh- u. Werkstoff* 12 (2), 1954 (44–6). 7 refs. [G.g.] P.R.

Describes the methods of attack and the appearance of damage done by *Reticulitermes* to Beech plywood (Kaurit glue with blood albumen), chipboards (Spruce chips with urea-resin glue), and Spruce fibreboards. Full protection (coating and deep impregnation) with phenol-formaldehyde resin glues or with repellents is recommended.

846. *Steaming*

2397. MANKEVIČ, L. A. Povyšenie proizvoditeljnosti proparočnyh ustanovok pri skorostnom gnutje drevesiny na stankah. [**Increased efficiency of steaming plants for rapid mechanical wood-bending.**] *Derev. lesohim. Prom.* 3 (10), 1954 (3–5). [Russ.] P.R.

Illustrated description of a steaming chamber used in the Maïkop furniture combine, its operation and efficiency. The author also recommends soaking air-dry wood in water at 80–85° C. (to raise the moisture content to 30%) before starting the steaming proper.

2398. WALTER, W. Die Formänderung des Buchenholzes beim Dämpfen. [**Dimensional changes of Beech wood during steaming.**] *Holz -Zbl.* 80 (140), 1954 (1645). [G.]

The results of the author's tests confirm the findings of MacLean [see *For. Abstr.* 15 (No. 2825)]. An inverse relationship seems to exist between the longitudinal contraction and the width of growth rings in Beech, when steamed at ca. 100° C.

847. *Drying (Seasoning)*

See also Nos. 2265–6, 2347, 2479.

2399. HEISKANEN, V. Eri tavoin käsitellyn koivupolttopuun kuivuminen. [**Drying Birch firewood differently treated.**] *Metsät. Aikak.* 1954 (11), (463–4). [Fi.e.]

The firewood was split into 1-m. billets, stripbarked in 2-m. lengths, or left unbarked in 2-m. lengths. The relative weight reduction was greatest in the billets and slight in unbarked bolts. The best drying period is May-June. The experiments continue. *From author's summary.*

2400. KITAMURA, H., and HASHIMOTO, H. [**The physical properties of logs in a timber yard.**] *Wood Ind., Tokyo* 9 (11), 1954 (520–4). [Jap.e.] P.R.

An investigation of the effect of storage for 5 months in a timber yard on *Fagus crenata* showed that barked wood seasoned more quickly but that differences in moisture content of barked and unbarked wood were slight after 5 months, and that there was no decrease in sp. gr. or compression strength during the period. *From authors' summary.*

2401. HROMCOV, M. **[Air-drying of sawn timber in winter.]** *Derev. lesohim. Prom.* 3 (6), 1954. [Russ.] From *abstr.* in *Holz-Zbl.* 80 (111), 1954 (1294). [G.]

Presents the results of 4 years' observations on the winter air-drying of coniferous sawn timber. An average drying rate of 0·38% m.c./day was obtained for Pine, and 0·15% m.c./day for Larch. Drying becomes hardly perceptible at − 28° C. or lower, although even the severest frosts cannot freeze all the water in the interior of wood. The frozen water is removed by the process of ice sublimation, the rate of which is greatest at the wood surface. With thin assortments stacked in the right way, it is possible to attain nearly air-dry conditions at the end of the winter season.

2402. SERGOVSKIĬ, P. S. **[On the mechanism of the movement of moisture in wood during convection-type drying.]** *Derev. lesohim. Prom.* 3 (4), 1954 (3–8). [Russ.] From *abstr.* in *Holz-Zbl.* 80 (111), 1954 (1294). [G.]

In accordance with the view accepted at present by Soviet scientists and technologists, illustrated by graphs and tables, (1) the rate of moisture movement at right angles to the grain varies as the moisture gradient and the coefficient of moisture conductivity, when the moisture content (m.c.) of wood is below fibre-saturation point (f.s.p.), whereas (2) with the m.c. > f.s.p., the rate of moisture movement is not determined by the moisture gradient. When initial m.c. > f.s.p., the wood surface quickly attains f.s.p. owing to the effect of air; a difference of capillary pressure is thus produced between the outermost and next adjacent wood layers. After some time, three zones are formed: (1) a diffusion zone, with m.c. < f.s.p., where the rate of moisture movement is proportional to the moisture gradient; (2) a zone in which the free moisture evaporates, this moisture increasing towards the middle of the wood, and its mean value being > f.s.p., and (3) a capillary zone where m.c. > f.s.p.

2403. STURANY, H. **Questions of flow in the drying of wood.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2016, 1954. pp. 10 + 15 photos + 1 dgm. Transl. by R. M. Wittels from *Holz Roh- u. Werkstoff* 10 (5), 1952 (201–7) [See *For. Abstr.* 14 (No. 799).] Limited distribution. P.R.

2404. **Technical session IV [of the 1954 national annual meeting of the Forest Products Research Society]—wood drying.** *J. For. Prod. Res. Soc.* 4 (5), 1954 (255–82).

Contains the following papers: Improving the thermal efficiency of dry kilns (*R. J. Hoyle, Jr.*); Steam consumption in the kiln drying of western softwoods [*Pseudotsuga taxifolia* and *Tsuga heterophylla*] (*V. C. Davis*); The outlook for high temperature seasoning in Canada (*J. L. Ladell*; 11 refs.); The effect of time, temperature and relative humidity on the relief of case-hardening stress (*J. W. Churchill*; 11 refs.); Alleviating bow and crook in southern Yellow Pine dimension with chemicals (*W. W. King*; 4 refs.); High temperature drying: its application to the drying of lumber (*J. S. Mathewson*; 11 refs.); and The effect of rays on the differential shrinkage of Red Oak [*Quercus borealis*] (*C. R. Morschauser*). [Cf. *For. Abstr.* 16 (No. 2175).]

2405. FECHNER, G. H. **The cost of drying lumber in small, electric kilns.** *Tech. Note Tenn. Vall. Auth.* No. 20, 1953. pp. 12 + 2 photos + 1 dgm. + 1 gph. 17 refs. P.R.

A study of electric power and demand costs for drying 4 × 4 lumber showed averages of $9·71 and $5·60 per 1000 bd. ft. at two electrically heated kilns in the Tennessee Valley. The primary factor affecting the greater cost was the drying time; that affecting the lesser cost was moisture-content difference from beginning to ending of drying. An important item of electrical drying costs is the demand charge, which varies inversely as the monthly production. It can be somewhat reduced by judicious operation. The costs of drying with electricity are somewhat higher than available figures for other methods of heating, even in this area of low-cost power. In contrast to the rather high cost of heating with electricity, the electrical kiln offers a low initial investment and low operating expenses. It is a convenient method of drying for the small shop operator. *Author's summary.*

2406. Trätorkning med rökgaser. **[Kiln drying with flue gases.]** *Svensk Trävarutidn.* 1954 (19), (1128, 1131). [Sw.]

A number of progressive kilns have been constructed in Sweden recently, using as the drying agent furnace gas from an oil furnace adjoining the kiln. Several of these kilns are briefly described and illustrated. The temperature of the gas/air mixture is kept at about 40° C. on entry into the kiln, to prevent seasoning defects. Temperatures are thermostatically controlled. Drying time varies with timber dimensions and moisture content but averages 3–4 days for Spruce and 4½–5 days for Pine. The kilns are of wood, with sawdust as insulation between the inner and outer walls. Investigations at a kiln at Lörstrand show that with a kiln capacity of 3 std./24 hr., oil consumption was 21 litres/hr. and heat consumption 1717 Kcal. Total drying cost (including installation, fuel and labour) is estimated at ca. Kr.80/std. There was no bluing in the seasoned timber, but there were a few checks and splits, and a slight reddening of the heartwood of Spruce, attributable to some chemical reaction with the gas, but probably not affecting strength properties.

2407. KREKEL, P., and LINICUS, W. Aluminium bei Holztrockenanlagen. **[Aluminium in wood-seasoning plants.]** *Holz* 8 (10), 1954 (223–7). [G.] P.R.

Pure aluminium (99·8% Al content) is recommended instead of iron as the inner structural material for kilns, particularly for hardwoods. Properties of this material are described, and several

examples of appropriate kiln construction are illustrated and described.

2408. JENKINS, J. H., and GUERNSEY, F. W. **The kiln-drying of British Columbia lumber.** *Bull. For. Br. Can.* No. 111, 1954. pp. 80.

Includes sections on: factors affecting drying; seasoning defects and their prevention; kilns and their equipment; and kiln operation (with schedules for British Columbia timbers).

2409. **Seasoning of Tawa.** *Rep. N.Z. For. Serv. 1953/1954*, 1954 (35).

Beilschmiedia tawa should be dried to an m.c. of 16% to ensure satisfactory floors. Correction tables have been established which permit the m.c. of Tawa treated with H_3BO_3 to be determined by moisture meters.

2410. ELLWOOD, E. L., GOTTSTEIN, J. W., and KAUMAN, W. G. **Project S.7–12—Vapour drying. Progress report No. 2. Experiment S.7–12/3—Vapour drying of 'Ash' type Eucalypts and Myrtle Beech (first report).** Division of Forest Products, C.S.I.R.O., Melbourne. 1954. pp. 29 + x + x + 4 photos + 7 gphs. 5 refs. Limited distribution. P.R.

Green 1-in.-thick quarter-sawn and flat-sawn *Eucalyptus gigantea* and *Nothofagus cunninghamii* developed pronounced degrade when vapour drying was carried out at atmospheric pressure, both at 395° and 260° F. (lower temperature obtained by use of a lower-boiling medium). Much better results were obtained by reducing temperature and operating at reduced pressure, the optimum conditions being 150° at a vacuum of 25 in. (ca. 25 mm. Hg absolute pressure), while comparative kiln runs at a dry-bulb temperature of 150° revealed very severe degrade. But for the unfavourable final moisture gradients in the timber, vapour drying compares favourably with kiln drying in modern laboratory internal-fan kilns under appropriate commercial schedules. The drying time depends on the schedule used and the b.p. of the working liquid. The average vapour-drying time for 1-in.-thick *E. gigantea* is 5 days.

2411. FESSEL, F. Praktische Ergebnisse der Zentrifugaltrocknung. **[Practical results of seasoning in centrifugal hydroextractors.]** *Holz* 8 (9), 1954 (205–9). 7 refs. [G.] P.R.

[Cf. *For. Abstr.* 15 (Nos. 2009–10).] Tabulates and graphs the seasoning periods required to reduce the moisture content of softwoods (Fir, Spruce, Pine) and hardwoods (Beech, Pear, Maple, Walnut) from 25% or 70% to 8%, using the hydro-extractor with spiral air circulation, the average seasoning temperature being 75° C. An improved design of the hydro-extractor is described and illustrated.

2412. JACOBSEN, H. **A contribution to the drying of Beech wood by centrifugal force.** *Transl. For. Prod. Lab., Can.* No. 76, 1954. pp. 9. 6 refs. Transl. from *Holz Roh- u. Werkstoff* 11 (10), 1953 (389–92). [See *For. Abstr.* 15 (No. 2011).] Limited distribution. P.R.

2413. GOTTSTEIN, J. W., and KAUMAN, W. G. **Centrifugal and pulsation drying.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 198, 1954 (1–4).

Reviews the history of these driers [cf. *For. Abstr.* 15 (Nos. 2009–10)], naming 6 investigations and illustrating recent models. Caution is advisable when considering a change-over from orthodox internal-fan cross-circulation driers because the new methods have not been thoroughly analysed either quantitatively or for cost, and because, even assuming the pulsatory method to have special merit, design is still in a state of flux.

2414. CHURCHILL, J. W., and DICKINSON, F. E. **The effect of time, temperature, and relative humidity on the relief of casehardening stresses.** *Mich. Wood Technol.* No. 2, 1954. pp. [3]. 3 refs. P.R.

The results of tests show that temperature alone can produce relief of casehardening stress. The most advantageous conditions for relief are obtained by combining moderate relative humidities with high temperatures. Too high relative humidity tends to produce reverse casehardening; this was found to be relieved, in some cases, in the high temperature and relative humidity ranges. *From authors' summary.*

848. *Timberyard Practice. Handling and Storage of Timber*

See Nos. 1831, 2363, 2400.

85. GRADING OF WOOD AND WOOD PRODUCTS

852. *Detection, Recognition and Assessment of Injuries and Defects*

See also Nos. 1807, 2106, 2154–6, 2162, 2212.

2415. **Staining of exposed wooden surfaces.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 7 (4), 1953 (19–20).

The results of a pilot study on the staining effect when the water-soluble tannins, sugars and starches are leached out in exposed timber are tabulated for ca. 50 Australian species as very pronounced, pronounced, and very little or no staining, when fastened with and without nails.

853. *Grading of Wood in the Rough*

See also Nos. 1614, 2085, 2098, 2260, 2543.

2416. OSTRANDER, M. D. **Log grading improvements.** *J. For. Prod. Res. Soc.* 4 (4), 1954 (171–6). 4 refs.

Discusses existing and proposed U.S.A. specifications for hardwood and softwood logs for various purposes.

2417. PFEIFFER, J. R., and WOLLIN, A. C. **Red Alder log and lumber grading.** *Rep. Ore. For. Prod. Lab.* No. *G*-3, 1954. pp. 7 + 10 tbls. + 2 dgms. + 2 gphs. 4 refs.

Results of trials on 472 eight-foot logs of *Alnus rubra* showed that the log-grading rules of the U.S. Forest Products Laboratory are suitable with minor modifications, that the lumber-grading rules of the National Hardwood Lumber Association are applicable to the lumber, and that the lumber-grade recovery from logs is comparable to that from many eastern hardwoods.

854. *Grading of Converted Timber*

See also Nos. 2085, 2105, 2260–1, 2289, 2417.

2418. JENKINS, J. H. **A national standard for Canadian lumber.** *B.C. Lumberm.* 38 (9), 1954 (42 . . . 47, 104).

Outlines the work of the exploratory committee of the Canadian Standards Association for the provision of nation-wide grading rules. Many of the present rules and the species and classes they cover are named.

2419. **Eastern Canadian Spruce.** Maritime Lumber Bureau, Amherst, Nova Scotia. 1953. pp. [14]. P.R.

Descriptions and illustrations of 5 grades of Spruce: MLB thirds and better, select fourths and better, fourths and better, fourths, and fifths.

2420. **Algonquin Hemlock, examples of grades.** *Timber of Canada* 15 (3), 1954 (30–3). 1 ref.

Summarizes recently revised grading rules for *Tsuga canadensis*, giving 8–10 photographs of 12-ft. boards in each of 3 grades (No. 1 choice structural for high-class framing, No. 2 for strong high-quality studding and rafter stock, No. 3 for use where appearance and strength are not essential), to illustrate with notes the defects and tolerances allowed.

2421. **Hardwood plywood institute standards for specifying hardwood plywood by grade.** *Timberman* 55 (12), 1954 (96).

Five photographs of Birch veneer, showing typical characteristics for all hardwood panels, illustrate the quality required for custom, good, sound, utility and reject grades.

2422. **Grading standard for Douglas Fir plywood.** Plywood Manufacturers Association of British Columbia. No. [*AIA* 19-*F*], 1951. pp. 2. P.R.

Contains sections on: Douglas Fir plywood, general and construction grade, and an appendix dealing with sampling and test procedures.

86. PULP INDUSTRIES. COMPOSITE MATERIALS MADE WHOLLY OR PARTLY OF WOODY MATTER. CHEMICAL UTILIZATION OF WOOD

See also section 813.

861. *Pulp and Paper Manufacture. Textile and Other Cellulose Derivatives*

See also Nos. 1805, 1811, 2311–2, 2362–3.

2423. **The literature of cellulose and other materials related to the pulp and paper industry.** *Tappi* 37 (9), 1954 (152*A*–196*A*). P.R.

Includes the following: The literature of cellulose and related materials (*W. M. Hearon*), tabulating journals and special publications covering this field; Abstract services covering the chemistry of cellulose and related fields (*C. L. Brown*), with an appendix listing 207 abstracting publications; The literature in the field of cellulose and its related materials (*E. C. Jahn* and *C. V. Holmberg*); Available bibliographies in the cellulose, pulp, and paper fields (*J. Weiner*) (over 600 items); The literature spectrum of cellulose chemistry (*H. Skolnik* and *L. F. McBurney*); and The path of the searcher in the literature (*G. J. C. Potter*).

2424. STREYFFERT, T. **The wood pulp industry of the world: trends and prospects [in production and consumption].** *Svensk PappTidn.* 57 (19), 1954 (709–17). [E.] P.R.

2425. **Pulp and paper mill. A £20 million British project in Tennessee.** *Wood* 19 (11), 1954 (436–41).

Notes on the lay-out, power sources, equipment, organization and output of the new Bowater mills, which depend on Southern Pines for their pulpwood and which have contracted their annual supply of 130,000 tons of newsprint to the newspapers of the Southern States for the next 15 years.

2426. STEENBERG, B. **Report to the government of Northern Rhodesia on a preliminary pulp and paper survey.** *Expanded Technical Assistance Program FAO Report* No. 274, 1954. pp. 47.

There are potential raw materials for pulp production in N. Rhodesia, mainly from *Brachystegia* and *Isoberlinia* spp. in northern woodlands, but present consumption of paper in the territory is too small to absorb the output of a mill of economic size.

2427. BLANFORD, H. R. **Forestry in relation to the paper and board industry—with discussion.** *Proceedings of the Technical Section, British Paper and Board Makers' Association (Inc.), Kenley* 33 (2), 1952 (321–36). L.S.

Reviews the world position with regard to pulpwood supply. No exploitable increase may be expected from America or Europe (excluding Russia). Large-scale afforestation has been going on with quick-growing conifers and Eucalypts in S. Africa, E. Africa, Australia, New Zealand and S. America, and such forests, worked on a short rotation, seem to be the most promising sources of supply.

2428. LESLIE, A. J. **The pulp and paper industry in relation to state forestry in Australia.** *Aust. For.* 18 (1), 1954 (50–7).

Attempts to analyse the relationship between the pulp and paper industry and State forestry, taking Victorian conditions as an example. The industry has an interest, at least equal to that of the State forestry authorities, in sustained-yield forestry, and can play an important role in assisting the State to work towards management for sustained yield. In many of the forests cut for mill logs during the past decade, the volume of cull wood, both standing and on the ground, has often presented a serious obstacle to the establishment and development of satisfactory regeneration. The ability of the industry to utilize much of this material is of great potential value to State forestry. The amount and type of this logging residue that can be used is limited by the economic conditions and disadvantages which handicap the industry. Recent work shows that wood quality in relation to the quality of the finished product also exercises an economic, as well as a technical influence. Because of these factors it is essential for the industry to have a substantial amount of high-quality wood in its raw material furnish, and this introduces the novel concept of management of State forests primarily for pulpwood.

production. At first sight, this prospect may appear undesirable to many State foresters, but there are several considerations which make it at least worth thinking about, if not attractive. *From author's summary.*

2429. KOEPPEN, A. VON, and SITZMAN, L. **Project PP. 17—Pulping properties of tropical timbers. Sub-project PP. 17–1. The pulping properties of New Guinea timbers. Progress report No. 2. Investigation of two *Araucaria* species.** Division of Forest Products, C.S.I.R.O., Melbourne. 1954. pp. 31 + 6 gphs. 21 refs. Limited distribution. P.R.

Presents results of an investigation on the morphology, and chemical and pulping properties of *A. klinkii* and *A. cunninghamii* from Bulolo Valley, New Guinea. Chemical analyses gave results quite similar to those of European softwoods. The differences between virgin and plantation-grown trees were very small. The average tracheid length for unbeaten kraft pulps from virgin-growth trees was 5·6 mm. The cell dimensions indicate that both species should produce pulps with good strength properties. The yields and strength of the sulphate and sulphite pulps from both species are tabulated.

2430. BHAT, R. V., and JASPAL, N. S. **Indigenous cellulosic raw materials for the production of pulp, paper and board. XXIII. Chemical pulps and writing and printing papers from *Saccharum procerum* Roxb. (*Bhutang.*).** *Indian For.* 80 (11), 1954 (709–17 + 2 sample sheets).

Average fibre length of the pulp is 2·3 mm. Easy bleaching pulps in yields higher than those from Bamboo or sabai grass were obtained, and papers of good quality were made from them.

2431. ISTAS, J. R. Belang van de biometrie in het onderzoek van grondstoffen voor een Kongolese pulpnijverheid. **[The place of biometric analysis in research on raw materials for a Congo pulp industry.]** *Bull. agric. Congo belge* 45 (5), 1954 (1249–76). [Flem.f.] [Laboratorium voor Scheikundige Onderzoekingen, Tervuren.]

Gives the length (*L*), diam. (*E*), width of lumen (*C*), and wall thickness (*W*), $C/E \times 100$ ('coefficient of flexibility') and E/L ('coefficient of felting') of fibres of ca. 135 species (33 families) mainly indigenous in the Belgian Congo. Among exotics are 3 Pines, 6 Cypresses, 13 Bamboos and 8 Eucalypts. Properties of papers made from *Musanga smithii*, *Fillaeopsis discophora*, *Piptadenia leucocarpa*, *Dialium corbisieri* and three Bamboos are also given.

2432. CASTAGNE, E. Analyses chimiques des bois. **[Chemical analyses of wood [for paper].]** *Rapp. Inst. nat. Étude agron. Congo belge 1953*, 1954 (499–500). [F.]

Reports that 23 broadleaved species were examined in 1952–53 for pulp yield, economy in reagents, indices of delignification and purification, and paper. *Musanga*, *Celtis mildbraedii*, *Fillaeopsis discophora*, *Chlorophora excelsa*, *Eucalyptus globulus*, *Polyalthia suaveolens* and *Strombosia glaucescens* gave the best results. For the production of strong white paper the first two are excellent.

2433. BRYANT, L. H. **Pulp and paper from Australian Eucalypts.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 7 (4), 1953 (11–5). 3 refs.

The bulk of the annual production of Eucalypt pulp in Australia comes from 3 mills: (1) in Victoria, providing 40,000 tons of sulphate pulp, which constitutes 35–90% of the furnish for 130,000 tons of paper and board products. Of 9 species used, *E. regnans*, *E. sieberiana*, and *E. gigantea* are preferred; (2) on the Derwent River, Tasmania, has a potential of 80,000 tons of groundwood for newsprint using the first and third species mentioned and *E. obliqua*; (3) at Burnie, Tasmania, produced a bleached soda pulp from *E. obliqua*, *E. gigantea*, *E. amygdalina* and *E. viminalis*, which when mixed with 10% imported softwood pulp is made into fine writing and printing papers, the only war-time source in Australia for these materials. A pulpwood opportunity is indicated at Twofold Bay, N.S.W.

2434. MEREWETHER, J. W. T. **The effect of alkaline pulping on the lignin of *Eucalyptus regnans*.** *Tappi* 37 (11), 1954 (483–7). 8 refs. P.R.

Lignin derivatives obtained from three lignins derived from *E. regnans* (by alkaline pulping, ethanolysis, and an alkali lignin converted to an ethanolysis product) have been analysed; the analysis results suggest that the alkaline pulping of *E. regnans* eliminates 2 alcoholic hydroxyl groups and a carbonyl group.

2435. **Hardwood pulping for the Northeast. [Papers presented at the Hardwood Pulping Conference at Amherst, Mass., on Sept. 14, 1954.]** *Paper Tr. J.* 138 (42), 1954 (42 . . . 62). 15 refs. P.R.

Includes the following: Hardwood timber resources in the Northeast and their availability for pulpwood (*J. R. McGuire*); Hardwood pulpwood procurement in the Northeast (*F. C. Simmons*); Hardwood disposal—a pressing forestry problem (*C. L. Tebbe*); Chemi-peeling hardwood (*D. B. Cook*) and Pulping processes for Northeastern hardwoods (*G. H. Chidester*).

2436. BERGEK, T. Björken som råvara för massaframställning. **[Birch as raw material for pulp.]** *Norsk Skogind.* 8 (11), 1954 (372–9). [Sw.e.] P.R.

Discusses chemical and structural differences between Birch and Spruce wood and their effect on pulping, the types of paper for which Birch can be used, recommended pulping processes, quality requirements as regards barking, decay and resin content, and costs.

2437. JENSEN, W., SKOGMAN, R., and FRANZÉN, S. Björk som råmaterial för massaframställning. VII. Sambandet mellan viskositet och styrka hos blekt björksulfat- och sulfitmassa. **[Birch as raw material for pulp. VII. The relationship between viscosity and strength in bleached Birch sulphate and sulphite pulp.]** *Pap. ja Puu* 36 (10), 1954 (387–90). 9 refs. [Sw.e.] P.R.

Cf. *For. Abstr.* 16 (No. 1187).

2438. RICHARDS, E. G. **Utilisation development.** *Rep. For. Res. For. Comm., Lond. 1952/53*, 1954 (76–9).

The Rural Industries Bureau completed their survey of the underwood industry in Great Britain. Preliminary figures for Hazel have been worked out and show that only a small fraction of the total area of Hazel is at present being utilized. An attempt was made to test its suitability for making fibreboard in a full-scale mill trial using a mechanical pulping process. The material consisted of unbarked shoots over 2 in. in diameter. The results were satisfactory, but Hazel is not likely to be used commercially as long as there are adequate supplies of conifers, Willow and Poplar. Paper-making trials were conducted on a laboratory scale using whole shoots of Hazel and the NaOH method of pulping. Preliminary reports indicate that: (1) Hazel shoots can be pulped satisfactorily with NaOH solutions without removal of bark. (2) Bleached pulp with a reasonably good degree of whiteness can be produced by treatment with $Ca(OCl)_2$ solution. (3) The bast fibres from the bark are fairly short, and do not contribute any outstandingly valuable characteristics to the pulp. (4) Sample sheets prepared from Hazel pulp had good strength properties, good formation, and good capacity, and on the mill scale such a pulp could be converted into a useful printing paper.

2439. VILARS, J. Pâte de feuillus obtenue par traitement des copeaux avec la soude caustique à l'air libre. **[Pulp obtained from broadleaved species by treating the chips with NaOH under atmospheric pressure.]** *Chim. et Industr.* 72 (1), 1954 (67–8). [F.] D.S.I.R.

Research on the pulping of Hornbeam, Poplar, Birch, Lime, Oak and Beech with NaOH at ordinary temperature (15–20°C.), 60° and 90°C. in open vats without stirring, indicates the possibility of using the resultant pulp in the manufacture of cardboard and, for some species, probably in paper industry.

2440. LEA, D. C. **An orienting study of the effect of the neutral sulphite semichemical cook on the hemicelluloses of Aspenwood.** *Tappi* 37 (9), 1954 (393–9). 29 refs. P.R.

Results of experiments indicate that, under the neutral sulphite semichemical cooking conditions used in this research; (1) $\frac{1}{3}$ of the hemicelluloses are removed from the pulp during the cook; (2) $\frac{1}{4}$ of the hemicelluloses removed can be recovered from the spent liquor in a relatively undegraded form; (3) the hemicelluloses remaining in the pulp are not degraded; (4) the hemicelluloses from Aspen pulp or its holocelluloses have greater intrinsic viscosities than the corresponding ones from Aspen wood or its holocelluloses, though the results of chemical analyses are similar; (5) there are no free simple sugars, di-, or trisaccharides in the spent liquors; and (6) much of the ultraviolet absorption at 2800Å of the filtrates from the lignin determination of hemicelluloses is probably due to degradation products of the pentosans. *From author's summary.*

2441. PROSIŃSKI, S. Z badań nad wyodrębnianiem masy celulozowej z drewna topoli czarnej i białej. **[Investigations on the pulping of *Populus nigra* and *P. alba*.]** *Sylwan* 98 (3), 1954 (229–38). 19 refs. [Pol.pol.]

It was found that the wood of both species contains 52% of cellulose, allowing > 50% of pulp to be obtained. *P. nigra* (*A*) contains less, and *P. alba* (*B*) more extractives (ethanol/benzene-soluble) than coniferous woods; these extractives consist $\frac{2}{3}$ of gums and oils, and $\frac{1}{3}$ of waxes. Pulp from *B* requires bleaching. There are more pentosans and less lignin in Poplar wood than in coniferous woods. Sulphite digestion proceeded better with *A* than *B*, and with branchwood than stemwood.

2442. MIKAWA, H. **Cooking mechanism of wood. IV. Identity of groups of lignin which play roles in $Na_2SO_3 + NaHSO_3$ (pH 6) and H_2S digestion and which combine with phloroglucinol.** *Journal of the Chemical Society of Japan* (*Industrial Chemistry Section*), *Tokyo* 55 (5), 1952 (294–6). 10 refs. [Jap.] From *abstr.* in *Chem. Abstr.* 47 (22), 1953 (12806). P.R.

Cf. *For. Abstr.* 15 (No. 2044).

2443. ROZENBERGER, N. A. K voprosu o himizme suljfitnoĭ varki elovoĭ drevesiny. **[The chemistry of sulphite cooking of Spruce wood.]** *Bumažnaja Promyšlennostj*, *Moskva* 28 (1–3), 1953 (13–9; 14–20; 14–8). 11 refs. [Russ.] P.O.

2444. **High yield sulphite pulping; a monograph in 8 parts: Part. 1. High yield sulphite pulping with a soluble base. Part 5. The direct measurement of pH at elevated temperature and pressure during sulphite pulping.** *Pulp Paper Mag. Can.* 55 (10), 1954 (113–31). 27 refs.

Dwindling forests, higher costs, and shortage of sulphur have stimulated 17 companies to put $300,000 into research, now 3 years old, the main emphasis of which is on pretreatment and cooking for the production of high-yield pulp. Spruce, Western Hemlock and Poplar are being studied.

2445. HOGE, W. H. **The resistance of Douglas Fir to sulphite pulping.** *Tappi* 37 (9), 1954 (369–76). 38 refs. P.R.

The precipitate formed in Ca-base cooks was found to be mainly anhydrous $CaSO_4$ with small amounts of S, both being products of bisulphite decomposition. Dihydroquercetin in Douglas Fir reduces bisulphite to thiosulphate which promotes bisulphite decomposition. In the first stage, the wood reduces the concentration of the thiosulphate catalyst, thus retarding the decomposition. No evidence was found of the formation of an insoluble lignin-inhibitor complex in cooks of Douglas Fir or Spruce impregnated with dihydroquercetin. The difficulty in the sulphite pulping of Douglas Fir is attributed to the slow rate of lignin removal, owing to which the bisulphite decomposition reactions can form large amounts of H_2SO_4 before delignification is completed. This acid precipitates the base as $CaSO_4$. *From author's summary.*

2446. MAŠIREVIĆ, Đ. Neke karakteristike u osobinama sulfatne celuloze od bosanske smrče i jele. **[Some characteristic properties of sulphate pulps of Bosnian *Picea abies* and *Abies alba*.]** *Glasnik Hemiskog Društva, Beograd* 17 (4), 1952 (215–42). 17 refs. [Serb.serb.e.] L.S.

The Bosnian woods have a lower density than Austrian, and hence a lower yield in sulphate cooking. *P. abies* gives a greater fibre length (ca. 6 mm.) than *A. alba*, but the latter yields more lignin and less pentosans.

2447. KUNUGI, T., and UCHIDA, K. **Hydrotropic solvents. I. Digestion of wood with aqueous solution of sodium xylene sulfonate.** *Journal of the Chemical Society of Japan* (*Industrial Chemistry Section*), *Tokyo* 56 (8), 1953 (634–6). 4 refs. [Jap.] From *abstr.* in *Chem. Abstr.* 48 (20), 1954 (12404). P.R.

2448. LA CELLULOSE DU PIN. Procédé de défibrage du bois. **[Pulping of wood.]** *French Patent* No. 1,011,120, June 19, 1952. pp. 2. [F.] P.O.

Wood rich in resin is digested under pressure at high temperatures with alkali sulphides and added alkali polysulphides.

2449. PEHRSON, S. O., and PETTERSSON, T. **Preservation of groundwood pulp against fungal attack: combined treatment with phenyl mercury and pentachlorophenol.** *Svensk PappTidn.* 57 (21), 1954 (801–7). 5 refs. [E.e.g.] P.R.

862. *Composite Materials made Wholly or Partly of Woody Matter*

See also Nos. 2166, 2270, 2273, 2358, 2396, 2469.

2450. **Technical session II [of the 1954 national annual meeting of the Forest Products Research Society]—wood composition board.** *J. For. Prod. Res. Soc.* 4 (5), 1954 (207–33).

Contains the following papers: The use of plastic-surfaced composition board in home and school furniture (*D. McCalla*); Effect of particle size and shape on strength and dimensional stability of resin-bonded wood-particle panels (*H. D. Turner*; pp. 210–23; 14 refs.); The manufacture of general-purpose and decorative pressed wood boards by a dry process (*A. L. Mottet*); The manufacture of molded articles from resin-bonded granulated wood (*F. H. Williams* and *J. Grano, Jr.*); and Extruded resin-bonded wood-particle board (*J. M. Crafton*).

2451. GRANTHAM, J. B. **Hardboard manufacturing possibilities for the Rocky Mountain Territory.** *J. For.* 52 (10), 1954 (748–9).

Discusses available species, and costs of raw material and manufacturing plant.

2452. DOSOUDIL, A. Prüfverfahren für Holzfaser- und Holzspanplatten. Kurze Übersicht mit Diskussionsvorschlägen. **[Testing methods for wood chipboards and fibreboards. A brief survey with suggested heads of discussion.]** *Holz Roh- u. Werkstoff* 12 (2), 1954 (55–64). 19 refs. [G.g.] P.R.

Discusses the testing methods recommended in different countries for the determination of: water uptake and swelling, permeability to water, form stability, bending strength, tensile strength, compression strength, shear strength, strength of bolted joints, hardness, impact strength, puncture, durability, wear, surface quality, heat conductivity, acoustic properties, combustibility, and resistance to fungi and insects.

2453. WINTER, H., and FRENZ, W. Ein Beitrag zu den Prüfverfahren für die Kennzeichnung der Eigenschaften von Holzspanplatten. **[Testing methods for determining the properties of wood chipboards.]** *Holz Roh- u. Werkstoff* 12 (9), 1954 (348–57). [G.g.] P.R.

Presents the results of tests conducted, in accordance with different standards and methods, on chipboards of different makes. The tests covered physical, strength and working properties. The results will serve as the basis for establishing new test methods.

2454. STEINER, K. Über Verfahrenstechnik und Maschinen zur Herstellung hochwertiger Holzspanplatten. **[Methods of, and machines for, manufacturing high-quality wood chipboards.]** *Holz Roh- u. Werkstoff* 12 (9), 1954 (343–8). 3 refs. [G.g.] P.R.

Illustrated description of the manufacture, in the same operation, of a 3-layer chipboard (outer layers more homogeneous and resistant, the thicker core layer less homogeneous), used in Germany in the furniture industry.

2455. **How to make pressed-wood boards by dry process.** *Wood, Chicago* 59 (9), 1954 (23–4). P.R.

Describes the manufacture of resin-bonded fibreboards from cross-cut fibre and cross-cut wood flakes, prepared by a process in which the cutter knife traverses the wood $\perp$ to the grain with the knife edge $\parallel$, thus cutting fibres or flakes of predetermined length and thickness.

2456. PATTON, E. A. (to Curtis Companies, Inc.). **Method of making molded panels.** *U.S. Patent* No. 2,682,083, June 29, 1954. pp. 9 + 18 dgms. P.O.

Example: 86·3% pulverized sawmill waste, 7·7% water and 6% by weight phenol-formaldehyde resin are mixed and pressed at 300–400 lb./sq. in. and 338° F., the edges being more compressed than the rest of the panel.

2457. SERRES, J. P. J. **Process of agglomerating particles of wood and the product thereof.** *U.S. Patent* No. 2,638,421, May 12, 1953. pp. 4. 10 refs. P.O.

The mixture contains, besides particles of wood, also at least 25% of a substance selected from the group consisting of thiophen and its alkyl-substituted derivatives in admixture with a liquid hydrocarbon; the agglomerated material is heated and pressed.

2458. BECHER, H. L. (to Homasote Co.). **Fire-resistant product from comminuted woody material, urea, or melamine-formaldehyde, chlorinated hydrocarbon resin, and hydrated alumina.** *U.S. Patent* No. 2,680,102, June 1, 1954. pp. 3. 1 ref. P.O.

One example is a sheet consisting of 100 parts by weight of sawdust and a binder, the latter being composed of ca. 41 parts by weight of hydrated alumina, 8 parts of chlorinated paraffin (70% Cl content), and 17 parts of urea-formaldehyde resin.

2459. DICKINSON, T. A. **New reclamation process. Low cost advantages of converting chips to cellulose fibres.** *Woodwkg. Ind.* 11 (9), 1954 (519–20). P.R.

Brief description of a new process of manufacturing wood-fibre resin-bonded mouldings from wood

waste; the proportion of resin can be as low as 3% by weight.

2460. KLAUDITZ, W., and STOLLEY, I. Entwicklung und Herstellung pilz- und termitenfester Holzspanplatten. **[Development and manufacture of chipboards resistant to fungi and termites.]** *Holz Roh- u. Werkstoff* 12 (5), 1954 (185–9). 7 refs. [G.g.]

An addition of pentachlorophenol (ca. 1·5% of oven-dry weight of wood chips in the form of an aqueous solution of the Na salt) yielded fungus-resistant chipboards. It is advantageous technologically to incorporate free pentachlorophenol into the aqueous colloidal solutions of the synthetic-resin binders used in the manufactures of chipboards; when using urea-formaldehyde resins as binders, the addition of 1·5% pentachlorophenol gives chipboards resistant to both fungi and termites.

2461. NARAYANAMURTI, D., and SINGH, H. **Studies on building boards. Part VII. Building boards from tannin-containing lignocellulosic materials.** *Comp. Wood* 1 (5), 1954 (121–4). 4 refs. P.R.

Tabulates data (water absorption, swelling, and mechanical strength) for boards made from (1) the bark of Sal (*Shorea robusta*), (2) areca-nut husks, and (3) spent tea leaves.

2462. ENDLER, G. Thermo-mechanischer Holzaufschluss zur Verwendung von Abfallhölzern, Schnitzspänen und Stubben. **[Thermo-mechanical digestion of wood for the utilization of wood waste, chips and stumpwood.]** *Papier, Darmstadt* 8 (9/10), 1954 (185–6). [G.] P.O.

Brief illustrated description of an installation for manufacturing fibrous material for fibreboards from wood waste, incorporating a worm feed for compressing the cut material and preventing fires. Steam at 3–3·3 atm. pressure is used.

2463. VORREITER, L. Das Langfaser-Holzaufschlussverfahren und die Langfaserplatte. **[The long-fibre wood digestion method and the long-fibre fibreboard.]** *Papier, Darmstadt* 8 (1/2), 1954 (7–13). 13 refs. [G.g.] P.O.

In the new method described, the forest or industrial coniferous wood waste is cut into blocks 40–100 mm. long, cooked without pressure in an alkali liquor for ca. 2 hours, subjected to after-treatment in diffusers without further supply of heat, and defibrated by a water-jet defibrator. The fibre chains and bundles obtained are then processed to form fibreboards, wall construction units, and packing materials. The yield of the long-fibre material is 78–83%. Fibreboards 0·2–10 cm. thick and 0·115–1·2 g./c.c. in density can be made.

2464. FROST, O. W., and TOWER, G. E. (to Stimson Lumber Co.). **Method of making hardboard.** *U.S. Patent* No. 2,680,995. June 15, 1954. pp. 9. 9 refs. P.O.

Wood-fibre pulp with thermosetting resin.

2465. HAMBURG, H. (to Syntics Ltd.). **Manufacture of articles such as boards and sheets from fibrous vegetable materials.** *U.S. Patent* No. 2,676,884, April 27, 1954. pp. 3 + 3 dgms. 24 refs. P.O.

The fibrous material (sawdust, shavings, etc.) is treated with 1·5% NaOH solution to form a pulp, washed from excess of NaOH, treated with 5% $Ca(OH)_2$, diluted with water to form a slurry, adding a solution of $(NH_4)_2CO_3$ to precipitate Ca, and formed into articles, which are then dried and heat-treated.

2466. HAMBURG, H. (to Syntics Ltd.). **Manufacture of articles such as boards and sheets from fibrous vegetable materials.** *U.S. Patent* No. 2,676,885, Apr. 27, 1954. pp. 3. 28 refs. P.O.

A variant of the process covered by *U.S. Patent* 2,676,884, involving the use of $Ca(OCl)_2$ instead of $Ca(OH)_2$.

2467. MOSSBERG and NYSTRÖM (to Aktiebolaget Statens Skogsindustrier). Procédé pour l'imprégnation de matériaux fibreux. **[Method of impregnating fibrous materials.]** *French Patent* No. 1,039,528, Oct. 7, 1953. pp. 5. [F.] P.O.

The material (e.g. fibreboards) is impregnated when in the form of felt, before the final compression, with e.g. an alkyd resin (or modified tall-oil product) applied as an aqueous emulsion.

863. *Wood Hydrolysis. Saccharification*

See also No. 2198.

2468. HALL, J. A. **Polyhydric alcohols from wood.** *Rep. U.S. For. Prod. Lab., Madison* No. 1984, 1954. pp. 19 + [2]. 37 refs. P.R.

A review of available literature (mostly American), including patents, and description of current projects at Madison. Although wood sugars are suitable for any fermentation requiring glucose as a substrate, some wood-sugar solutions must be first purified; ion-exchange resins or activated charcoal gave good results for this purpose. It was shown that 2,3-butylene glycol and glycerine can be produced from wood sugars. The sugars from acid hydrolysis were also purified, hydrogenated to their respective alcohols and subjected to hydrogenolysis, which gave good yields of glycols and glycerine. The process is not yet ripe for industrial application.

865. *Plastics*

2469. NARAYANAMURTI, D., and SINGH, J. **Studies on building boards: Part VI. Preparation of plastics, boards etc., from wood waste, barks etc., by thermal treatment in presence of water and by other methods.** *Comp. Wood* 1 (4), 1954 (89–93). 6 refs. P.R.

Tabulates the results of treatment of lignocellulosic materials with water at high temperatures (preparation and analysis of moulding powders, physical properties and analysis of moulded products). The materials investigated were: wood waste from *Acacia catechu*, *Bombax malabaricum*, *Cedrela toona*, *Dysoxylum malabaricum*, *Manihot utilissima*, *Pinus longifolia* and *Zanthoxylum rhetsa*, and bark of *Araucaria* sp., *Euphorbia nivulia* and *Erythrina suberosa*. Properties of chipboards made of *M. utilissima* wood, and *Araucaria* bark, with addition of different chemicals, are described and tabulated.

2470. HESSEL, F. A., and CANFIELD, W. B. (to Montclair Research Corp. and Ellis-Foster Co.). **Wallaba woodflour molding composition.** *U.S.*

Patent No. 2,681,893, June 33, 1954. pp. 3. 8 refs. P.O.

Wallaba wood flour or the (ethanol-) extracted resin, or both, can be mixed with phenolic resins to yield hard moulded products of good water- and alcohol-resistance.

866. *Utilization of Wood Extractives*

See also Nos. 1575, 1808, 1928, 2515.

2471. HUDOVEKOV, V. D. **The processing of resinous wood.** *Derev. lesohim. Prom.* 3 (1), 1954 (11–6). [Russ.] From *abstr* in *Chem. Abstr.* 48 (19), 1954 (11781). P.R.

Vacuum distillation of wood from fresh Pine stumps or boles for the recovery of turpentine (*A*) and rosin (*B*) was studied. Chips 10 × 10 × 2 up to 30 × 30 × 4 mm., and slabs 10–30 cm. long were heated to 80° C., then to the maximum temperature of 230–240° with superheated steam or inert gases, and evacuated at the maximum temperature for distillation of *B*. In the vacuum-distillation process, *B* is obtained at a lower cost than by extraction. Summarizing the process, the maximum temperature was 230–240°, temperature of entering steam 260–280°, that of exit steam 225°, resin content of starting material 4–19% (oven-dry wood basis), reactor pressure during *B* distillation up to 100 mm. Hg, period of *A* and *B* distillations 1·5 and 3 hours, respectively, consumption of superheated steam 2·5 kg./kg. of o.d. wood, residual resin content 1·5–2%, yield of acetic acid 2·5%, yield of *A* 95% (of *A* present in wood). When no vacuum was used, the steam consumption was doubled, the yield of *B* was 80% of *B* present in the wood, and *B* required purification with benzine. Data are given for the % of *A* distilled from the wood as a function of time and temperature. Residual chips were suitable for the manufacture of fibreboard with good water resistance and dimensional stability. The author believes that the most economical process for the recovery of *A* and *B* is the distillation described above, followed by gasification of the chips, the gas being used in the distillation stage. Acid tars are processed later. Sketches are given of apparatus for batch and continuous distillation of resinous wood.

2472. PUROSHOTAM, A., and TEWARI, M. C. **A preliminary note on the preparation by a simple process, of copper and zinc preservatives from Chir resin.** *Indian For.* 80 (9), 1954 (560–8). 2 refs.

A simple and cheap method has been devised for using abietic acid obtained from *Pinus longifolia* resin, as a solvent in the preparation of Cu and Zn preservatives. A more detailed report will be published later. Data from graveyard tests on a number of species are given. Prices compare very favourably with those of commercial Cu and Zn naphthenates.

2473. SEIFERT, K. Die Entharzung von Wald- und Industrieabfällen der Kiefer. **[Resin extraction from forest and industrial waste of Pine.]** *Faserforschung und Textiltechnik, Berlin* 5 (1), 1954 (27–31). 6 refs. [G.] P.O.

Presents in a graph and tables the results of an investigation of the different properties of resin obtained from stumps, sawdust, and chips of *Pinus sylvestris*. Describes the methods used for determining 'oxy-acids', colour value [*Farbzahl*] according to Fonrobert, moisture and turpentine content of the wood. The resin yield during extraction increases with temperature and time, and with decreasing wood-particle size. Yields and properties of resin extracts are tabulated for different solvents. It is claimed that, for a number of solvents, the expression $\sqrt[3]{[FZ]} \times M/d \simeq 585$ gives good results, where $[FZ]$ is the colour value, M, the molecular weight, and d, density; larger deviations occur for solvents with double bonds.

2474. NAKATSUKA, T., and HIROSE, Y. **The essential oil from the wood of Incense Cedar (1). On the phenolic substances.** *J. Jap. For. Soc.* 36 (10), 1954 (280–3). [E.e.jap.]

The phenol content in oil of *Libocedrus decurrens* was about 42%, and consisted of two main constituents—carvacrol and an unknown phenol.

2475. O'BRIEN, K. G., PENFOLD, A. R., SUTHERLAND, M. D., and WERNER, R. L. **The sesquiterpene alcohol of [the wood oil of] *Myoporum crassifolium* Forst.** *Aust. J. Chem.* 7 (3), 1954 (298–300). 16 refs. O.R.S.

2476. COOMES, T. J., ISLIP, H. T., and MATTHEWS, W. S. A. **Muhuhu oil and Muhugwe wood (*Brachylaena hutchinsii*) from Tanganyika.** *Colon. Plant Anim. Prod.* 4 (2), 1954 (137–44).

Reports on experiments in distilling *B. hutchinsii* wood. In order that a good quality oil may be obtained, it is recommended that the aqueous distillate be redistilled for the recovery of the soluble oil.

867. *Destructive Distillation*

See also No. 2164.

2477. KOZLOV, V. N., and KOROLEVA, N. I. Termičeskoe rastvorenie drevesiny. **[The thermal conversion of wood into liquids and gases.]** *Ž. prikl. Him.* 26 (10), 1953 (1061–6). 4 refs. [Russ. russ.] P.O.

Spruce and Pine wood were comminuted, screened through a 1-mm.-mesh sieve, dried to constant weight at 100–105° C., and treated with various organic solvents (turpentine oil, Et acetate, ethanol, benzene, pyridine; anthracene oil, and other mixtures of solvents) in a revolving autoclave, the temperature rising to ca. 300°. This treatment transformed the wood into liquid and gaseous products. The most efficacious solvent was one consisting of 35% ethanol, 35% benzene, 10% tar oils, and 20% of products obtained from the treatment described. The yield of tar substances can attain 67·62% of the weight of the organic wood substance (the % of phenols in the tar reaching 40·42); the yield of volatile acids is 7·73–8·98% (calculated as CH_3COOH) of the oven-dry weight of wood.

2478. KOZLOV, V. N., SMOLENSKIĬ, V. B., and ARAŠKEVIČ, V. M. Polučenie vspenivateleĭ i organičeskih rastvoriteleĭ iz kisloĭ drevesnoĭ smoly. **[Foaming agents and organic solvents from acid wood tar.]** *Ž. prikl. Him.* 26 (9), 1953 (995–9). 7 refs. [Russ.russ.] P.O.

Results of an investigation show that acid wood tar is a valuable raw material for the manufacture of

flotation agents and organic solvents. The flotation oils obtained are particularly suitable for the treatment of the sulphide ores of non-ferrous metals.

2479. KOZLOV, V. N., and KRYMSKIĬ, G. P. **The influence of drying conditions on the yield of acetic acid in wood pyrolysis.** *Derev. lesohim. Prom.* 3 (1), 1954 (16–7). [Russ.] From *abstr.* in *Chem. Abstr.* 48 (19), 1954 (11781). P.R.

Presents results of determinations of the contents of acetyl and readily hydrolysed polysaccharides in Beech, Aspen, Pine, Spruce, Fir and Larch before drying and after drying at 100° and 125° C.

2480. YOSHIMURA, F., and INABA, T. **Active charcoal. I. Carbonization of wood with certain chemicals.** *Journal of the Chemical Society of Japan (Industrial Chemistry Section), Tokyo* 56 (1), 1953 (15–6). 4 refs. [Jap.] From *abstr.* in *Chem. Abstr.* 48 (13), 1954 (7879). P.R.

2481. ARAÚJO, J. BENEDITO DE. Carvão vegetal para alto-forno—alguns dados nacionais e estrangeiros. **[Vegetable charcoal for smelting furnaces—some data from Brazil and abroad.]** *Boletim, Laboratório da Produção Mineral, Rio de Janeiro* No. 36, 1952. pp. 135 + 3 photos + 9 tbls. 21 refs. [Port.e.]

With the rise in Brazilian production of pig iron, the question of fuel supply has become urgent. Minas Gerais no longer provides wood enough to produce charcoal for the metal industry, and is now drawing on other regions. Problems of demand and supply are discussed and figures for consumption of wood for charcoal are presented. The author gives the results of some ASTM tests on various Brazilian samples and compares them with those of the coke used at the Volta Redenda steel plant. An appendix gives summaries of some Swedish and Dutch publications on charcoal production.

89. OTHER ('MINOR') FOREST PRODUCTS

See also Section 28.

892. *Vegetable Products*

See also No. 2112.

892.1. Grass. Litter. Leaf Fodder

See also No. 1754.

2482. GUPTA, J. N. S. **Cultivation of Sabai grass (*Eulaliopsis binata*) in West Bengal.** *W. Bengal For. Bull.* No. 2, 1954. pp. 13. 17 refs. Price 1*s.* 1*d.*

892.4. Bark Products. Tanstuffs. Cork

See also Nos. 1475, 1575, 1771, 2312, 2461.

2483. GROUDAL, B. L., and DICKINSON, C. L. (to Weyerhaeuser Timber Co.). **Separation of bark components.** *U.S. Patent* No. 2,627,375, Feb. 3, 1953. pp. 8. 8 refs. P.O.

Bark (e.g. of Douglas Fir) with a moisture content of 30–80% is ground, dried to 10–25% m.c., and screened, with intermediate recycling and/or comminution; the ultimate products being: cork, 28 mesh plus; cork and fibre 28–65 mesh; fibre, 28–65 mesh; phloem, 65–325 mesh, and finer than 325 mesh.

2484. **[Tannin from *Pinus radiata* bark.]** *Rep. For. Comm. N.S.W. 1951/52*, 1954 (14).

Pinus radiata stands at Jenolan State Forest have been sampled to determine the return of tannin likely to be obtained from the bark. The results showed no significant effect of site quality or age and diameter of tree on tannin content, and the % of tannin obtained was high enough to justify hopes that this bark, if available in sufficient quantity, would be worth extracting.

2485. BURTON, D., and BARAT, S. K. **Vegetable tanning. VIII. The properties of Babul bark (*Acacia arabica*).** *Journal, Society of Leather Trades Chemists, Croydon* 38 (7), 1954 (223–32). 8 refs. L.S.

Tabulates the results of leaching of *A. arabica* bark. The liquor contains catechol tannins.

2486. ROUX, D. G. **The differential aqueous extraction of commercial Black Wattle bark.** *Journal, Society of Leather Trades Chemists, Croydon* 38 (4), 1954 (126–33). 23 refs. L.S.

Paper chromatography showed that the successive leaching of Black Wattle with cold and hot water yields 2 extracts which differ in tannin/non-tannin ratio and in the composition of the non-tannins.

2487. STOJANOV, V., and POŽARLIEV, G. Smradlikata kato surovina za proizvodstvo na dăbilni ekstrakti. **[*Rhus cotinus* as a raw material for tannin extracts.]** *Nauč. Trud. lesoteh. Fak. selskostopan. Akad., Sofia* 2, 1953 (179–86). [Bulg. russ.]

Experiments in Bulgaria show that the leaves, when collected at the right season (August) without any foreign admixtures and dried in shade, often contain > 20% of tannins (by weight of dry substance).

2488. JENSEN, W., and ÖSTMAN, R. **Studies on suberin. VII. Comparison of the chemical compositions of suberins from *Betula verrucosa* and *Quercus suber*.** *Pap. ja Puu* 36 (11), 1954 (427–8). 10 refs. [E.] P.R.

Cf. *For. Abstr.* 15 (No. 3092).

892.5. Medicinal Plants, Edible Plants, Insecticides from Plants, etc.

See also No. 2515.

2489. LÄÄKETEHDAS ORION OY. Menetelmä bioloogisten aktivaattorien eristämiseksi havuista ja vihreistä kasvinosista. **[Method of isolating biological activators from needles and other green parts of plants.]** *Finnish Patent* No. 25,648, March 31, 1952. pp. 1. [Fi.sw.] P.O.

Essential oils are first driven off by steam distillation, and the biologically active substances are obtained from hot-water extracts.

2490. UKITA, C., and MATSUDA, R. Über die antibakteriellen Bestandteile in Fructus *Juniperi japonicae*. **[Anti-bacterial components of *J. japonica* berries.]** *Pharmazie, Berlin* 8 (3), 1953 (302). [G.] L.S.

2491. WEBB, L. J. **Alkaloid potentialities of the Australian flora.** *Journal of the Australian Institute of Agricultural Science, Sydney* 19 (3), 1953 (144–57). 54 refs. L.S.

Reviews shortly the alkaloid-producing plants (both dicotyledons and monocotyledons) of Australia, including a large number of woody species.

2492. Bottomley, W., and Mortimer, P. I. **Variation in the main alkaloids of *Duboisia myoporoides* R. Br. and *D. leichhardtii* F. Muell. I. Chemical methods.** *Aust. J. appl. Sci.* 5 (3), 1954 (255–7). 6 refs. P.R.

2493. Hills, K. L., Bottomley, W., and Mortimer, P. I. **Variation in the main alkaloids of *Duboisia myoporoides* R. Br. and *D. leichhardtii* F. Muell. II. *Duboisia myoporoides*. III. *Duboisia leichhardtii*. IV. Interspecific hybrids.** *Aust. J. appl. Sci.* 5 (3), 1954 (258–91). 20 refs. P.R.

2494. Brown, F. C., Gilham, P. T., Hughes, G. K., and Ritchie, E. **The chemical constituents of Australian *Flindersia* species. V. The constituents of *Flindersia maculosa* Lindl.** *Aust. J. Chem.* 7 (2), 1954 (181–8). 13 refs. O.R.S.

Lists alkaloids obtained from the bark and leaves. [Cf. *For. Abstr.* 14 (Nos. 1762–3).]

2495. Cooke, R. G., and Haynes, H. F. **The alkaloids [from the bark and leaves] of *Evodia littoralis* Endl.** *Aust. J. Chem.* 7 (3), 1954 (273–6). 13 refs. O.R.S.

2496. Belikov, A. S., Banjkovskiĭ, A. I., and Carev, M. V. Alkaloid iz *Gleditschia triacanthos* L. **[Alkaloid from *G. triacanthos*.]** *Žurnal Obščeĭ Himii, Moskva* 24 (5), 1954 (919–22). 7 refs. [Russ.] P.O.

A new alkaloid, triacanthin, isolated from the leaves of *G. triacanthos*, is described.

2497. Sharma, V. N., Kohli, J. D., and Mukerji, B. **Chemistry and pharmacology of *Rauwolfia*.** *J. sci. industr. Res., India* 13*A* (6), 1954 (261–72). 54 refs. D.S.I.R.

2498. Monachino, J. ***Rauwolfia serpentina* —its history, botany and medical use.** *Econ. Bot.* 8 (4), 1954 (349–65). 133 refs.

A detailed account of this sub-shrub, including relationships, cultivation and chemistry.

2499. Schlittler, E., Schneider, J. A., and Plummer, A. J. Über *Rauwolfia*-Alkaloide. **[*Rauwolfia* alkaloids.]** *Angew. Chem.* 66 (13/14), 1954 (386–90). 74 refs. [G.g.] D.S.I.R.

A comprehensive review.

2500. Tschesche, R., and Petersen, R. Die Trennung der Alkaloide der Kurchirinde (*Holarrhena antidysenterica*) mit Hilfe chromatographischer Verfahren. **[Separation of alkaloids from the bark of *H. antidysenterica* by chromatographic methods.]** *Chem. Ber.* 87 (11), 1954 (1719–25). 11 refs. [G.g.] P.R.

Beside the known alkaloids conessine, conessidine, conessimine and conimine, chromatographic separation yielded an apparently unknown alkaloid $C_{22}H_{36}ON_2$ which is named holarrhesimine.

2501. Jacobucci, G. A. Ocoteina, un alcaloide aislado de la corteza de *Ocotea puberula* (Rich.) Nees. **[Ocoteine, an alkaloid isolated from the bark of *O. puberula*.]** *Anales de la Asociación química argentina, Buenos Aires* 42 (1), 1954 (18–29). 14 refs. [Span.span.] P.O.

Describes the isolation and properties of ocoteine, $C_{21}H_{23}O_6N$.

2502. Krewson, C. F., Fenske, C. S., Jr., Couch, J. F., and Naghski, J. **Rutin in *Eucalyptus* species.** *American Journal of Pharmacy, Philadelphia* 125 (4), 1953 (117–21). 14 refs. L.S.

Of 21 species growing in California only *E. macrorrhyncha* was found to contain rutin. Rutin content varied from 2·1% in leaves of seedlings to 23·1% in young leaves of mature trees. Rutin content of leaves from 1- to 2-year-old trees was comparable with that of mixed leaves from mature trees. *From authors' summary.*

2503. Humphreys, F. R. **Rutin—a drug extracted from Red Stringybark [*Eucalyptus macrorrhyncha*] leaves.** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 7 (4), 1953 (16–9).

This anti-haemorrhagic, containing vitamin P, constitutes ca. 6 (but up to 12) % of the leaves of *E. macrorrhyncha* and > 3% of the leaves of *E. gigantea*. For the latter, a profitable integration of Eucalyptus oil, rutin and sawlog production is suggested.

892.6. Resin and Turpentine. Essential Oils. Fixed Oils and Fats. Gums. Latex. Dyestuffs. Sap Sugar

See also Nos. 1475, 2471–6.

2504. Coveney, R. D., Islip, H. T., and Matthews, W. S. A. **Large-scale distillation trial of Slash Pine oleo-resin from British Honduras.** *Colon. Plant Anim. Prod.* 4 (3), 1954 (235–9).

Large-scale distillation of oleo-resin from *Pinus caribaea* has confirmed the indications of earlier samples [cf. *For. Abstr.* 13 (No. 342)] that this tree is a useful potential source of naval stores. The yield of turpentine was 18·5% on the oleo-resin and it was of good quality (almost in accordance with Type 1 Turpentine in B.S. No. 244).

2505. Iloff, P. M., Jr., and Mirov, N. T. **Composition of gum turpentines of Pines. XIX. A report on *Pinus ponderosa* from Arizona, Colorado, South Dakota, and northern Idaho.** *J. Amer. pharm. Ass.* (*sci. Ed.*) 43 (6), 1954 (373–8). 9 refs. O.R.S.

Cf. *For. Abstr.* 15 (No. 4384).

2506. Mirov, N. T., and Iloff, P. M., Jr. **Composition of gum turpentines of Pines. XX. A report on *Pinus chihuahuana* from Durango, *P. apacheca* from Arizona and *P. monticola* from northern Idaho.** *J. Amer. pharm. Ass.* (*sci. Ed.*) 43 (6), 1954 (378–81). 9 refs. O.R.S.

2507. Bardyšev, I. I., and Livšic, R. E. Sostav skipidara iz živicy pihty sibirskoĭ. **[Composition of turpentine oil from the resin of *Pinus sibirica*.]** *Ž. prikl. Him.* 26 (12), 1953 (1304–9). 14 refs. [Russ.russ.] P.O.

The turpentine oil contains α-pinene, β-pinene, camphene, bornyl acetate, Δ^3-carene, β-phellandrene, and, probably, dipentene and β-myrcene. It can be used as raw material for obtaining β-phellandrene and optically active camphor.

2508. PEJOSKI, B. Viskozimetriska ispitivanja nekih domaćih četinarskih balsama. **[Viscometry of some Jugoslavian oleoresins from coniferous species.]** *Šum. List* 78 (7), 1954 (316–9). 8 refs. [Croat.croat.f.]

A graph and table give the results of measurements at temperatures between 20 and 80° C. of the viscosity (Engler degrees) of the following oleoresins: filtered oleoresin of (*a*) *Pinus sylvestris*, (*b*) *P. halepensis*, (*c*) *P. nigra*, (*d*) *P. peuce*, (*e*) *P. heldreichii*; also (*f*) of crude *P. peuce* oleoresin, and (*g*) of Canada balsam. The figure for (*d*) at 30° is 2·36 times that for (*f*).

2509. GLUHOV, I. A. **The volatile oil of Archa (*Juniperus seravschanica*).** *Soobščenija Tadžikskogo Filiala Akademii Nauk SSSR* 26, 1950 (11–5). [Russ.] From *abstr.* in *Chem. Abstr.* 48 (20), 1954 (12377–12378). L.S.

Presents results of analysis of volatile oil from the leaves.

2510. PENFOLD, A. R., and WILLIS, J. L. **The essential oil industry of Australia.** *Econ. Bot.* 8 (4), 1954 (316–36). 6 refs.

Covers the botany of endemic oils of actual or potential value in commerce, physiological forms, production statistics, the distillation of oils of *Eucalyptus*, Tea-Tree (*Melaleuca alternifolia*), Australian Sandalwood (*Eucarya spicata*), and Boronia flower (*Boronia megastigma*), including yields/1000 lb. foliage or flowers, and the species used in medicine, industry and perfumery. Research on exotic oils and the future of the industry are also discussed.

2511. DEPARI, K. S. Keterangan ringkas mengenai *Eucalyptus globulus* Labill. **[Some notes on *E. globulus*.]** *Rimba Indonesia* 3 (8/10), 1954 (375–7). 2 refs. [Jav.e.]

A description of the tree, with data on distillation yields, nursery practice, planting in mixtures, and uses.

2512. BRANDT, C. W. **A constituent of the essential oil of *Myrtus bullata*.** *J. chem. Soc.* Sept., 1954 (3245–6). [University of New Brunswick.] O.R.S.

2513. NARAYAN, V. L., and MUTHANA, M. S. **Essential oil from *Premna tomentosa*.** *Journal of the Indian Institute of Science, Bangalore* 35*A*, 1953 (55–67). 21 refs. P.O.

The yield of oil is 0·073% (of the weight of leaves); it contains 57·8% limonene, 17·2% β-caryophyllene, 7·8% new sesquiterpene hydrocarbon, 5·6% unidentified sesquiterpene tertiary alcohol and 5·5% unindentified diterpene hydrocarbon.

2514. RAI, C., and MUTHANA, M. S. **Essential oil from the leaves of '*Annona squamosa* Linn'.** *Journal of the Indian Institute of Science, Bangalore* 36*A* (2), 1954 (117–21). 12 refs. P.O.

The oil contains: α-pinene (7%); unidentified monocyclic terpene (4%); β-caryophyllene (50%), and 5% each of two bicyclic sesquiterpene hydrocarbons.

2515. BROWN, E., COOMES, T. J., ISLIP, H. T., and MATTHEWS, W. S, A. **Oils of *Cinnamomum* spp. from Sarawak as a source of safrole.** *Colon. Plant Anim. Prod.* 4 (3), 1954 (239–43).

[Cf. *For. Abstr.* 16 (No. 1242).] Samples were obtained of (1) *C. parthenoxylon*, (2) *C. iners*, (3) an unidentified species known as *medang kerangas*. The wood of (1) and all parts (wood, bark, twigs and leaves) of (3) yield oil in appreciable quantities. That from (3) is particularly promising, as it has a high % of safrole: yields are 0·99% (75·5% safrole) from wood, and 5·48% (75·5% safrole) from bark. Owing to the low safrole content of the oil obtained from the leaves and twigs, these should be separated from the stem and bark before distilling the latter, otherwise the safrole content of the oil would be reduced. As this species grows on a podzol soil which is found difficult to utilize profitably in Sarawak, its propagation appears to offer the double advantage of using this soil type profitably and providing a non-dollar source of safrole. It is suggested that trial plantations should be established, possibly coppicing the trees as is done with *C. zeylanicum* in Ceylon for the production of cinnamon bark.

2516. RAYMOND, W. D., SQUIRES, J. A., and WARD, J. B. ***Dryobalanops oblongifolia* kernels and *Elateriospermum tapos* kernels from Malaya.** *Colon. Plant Anim. Prod.* 4 (2), 1954 (159–61).

The kernels of *D. oblongifolia* contain only 30% fat and it is unlikely that they could be developed as an oilseed. *E. tapos* seed oil has 30% solid fatty acids, and is of the non-drying kind. Any possibility of using it e.g. for soap making seems to be excluded by the popularity of the kernels as sweetmeats.

2517. PEEL, J. D. ***Keladan* and *perah* kernels.** *Malay. Forester* 17 (4), 1954 (206–7).

Cf. preceding abstract.

2518. SUBBARAM, M. R. **Analysis and characterisation of the oil from the seeds of *Thespesia populnea*.** *Proc. Indian Acad. Sci.* 39*A* (6), 1954 (301–4). 2 refs. O.R.S.

2519. CHOWDHURY, D. K., CHAKRABARTY, M. M., and SEN, N. K. **The component fatty acids of *Swietenia macrophylla* seed fats.** *Sci. & Cult.* 20 (1), 1954 (52–4). 3 refs. E.M.B.

The seeds of *S. macrophylla* have a thin pericarp yielding ca. 50% clear yellow oil on solvent extraction. The results of analyses of the fatty acids are presented.

2520. MARKLEY, K. S. **Caranday—a hard palm wax.** *Foreign Agric.* 18 (7), 1954 (137–8). E.M.B.

The Caranday Palm (*Copernicia australis*) grows in abundance over several thousand square miles of the Paraguayan Chaco and in adjoining areas of Bolivia and Brazil. It is only in the past decade that the value of the palm has received attention as a source of wax similar to carnauba wax. Since 1947 several firms have experimented with the production of caranday wax, but the industry lags because of low U.S.A. prices. Notes on harvesting and recovery of the wax are presented.

2521. HIRST, E. L., and PERLIN, A. S. **The gum of *Acacia pycnantha*.** *J. chem. Soc.* July, 1954 (2622–7). O.R.S.

The gum from *A. pycnantha* has been hydrolysed and its composition compared with gums from other *Acacia* spp. Evidence has been obtained that the molecular structure is complex and probably highly branched. Gums from various *Acacia* spp. probably differ widely in structural details.

892.7. Fruits. Seeds. Fibres, Yarns and Flosses

See also Nos. 2490, 2516–9.

2522. LEWIS, Y. S., DWARKANATH, C. T., and JOHAR, D. S. **Utilization of Tamarind pulp.** *J. sci. industr. Res., India* 13*A* (6), 1954 (284–6). 14 refs. D.S.I.R.

Presents results of research on chemical products obtainable from the fruit pulp of *Tamarindus indica*, including pectin, tartaric acid, and solutions fermentable to alcohol. [Cf. *For. Abstr.* 10 (No. 2893).]

892.8. Heather. Broom etc. Osiers. Canes and Bamboos. Reeds and Rushes. Thatching Materials

2523. SINEATH, H. H., DAUGHERTY, P. M., HUTTON, R. N., and WASTLER, T. A. **Industrial raw materials of plant origin. V. A survey of the Bamboos.** *Bulletin, Engineering Experiment Station, Georgia Institute of Technology, Atlanta* No. 18, 1953. pp. 230. 1321 refs. P.R.

893. *Animal Products*

2524. **Lac in India 1951–52.** Manager of Publications, Civil Lines, Delhi. 1954. pp. xiii + 29. Price *Rs.*2/6 (4*s.*). I.H.

The first issue of an annual publication of the Economic and Statistical Adviser, Ministry of Food and Agriculture. It includes a general account of the industry, seasonal production, figures and prices since 1938–39, imports and exports and the chief hosts in each state.

9. FORESTS AND FORESTRY FROM THE NATIONAL POINT OF VIEW. SOCIAL ECONOMICS OF FORESTRY

90. GENERAL

2525. Rapports annuels de politique forestière: France. [**Annual reports on forest policy: France.**] [*Docum.*] *European Forestry Commission, 7th Session, 1954.* No. *FAO/EFC/69–C*, 1954. pp. 12. [F.] Limited distribution.

2526. Rapports annuels de politique forestière: Luxembourg. [**Annual reports on forest policy: Luxembourg.**] [*Docum.*] *European Forestry Commission, 7th Session, 1954* No. *FAO/EFC/69–D*, 1954. pp. 5. [F.] Limited distribution.

2527. Rapports annuels de politique forestière: Belgique. [**Annual reports on forest policy: Belgium.**] [*Docum.*] *European Forestry Commission, 7th Session, 1954* No. *FAO/EFC/69–A*, 1954. pp. 9. [F.] Limited distribution.

2528. BOVIN, A. I. Za daljneĭšiĭ pod'em lesnogo hozjaĭstva. [**Further improvement of forestry [in the U.S.S.R.].**] *Lesn. Hoz.* 5 (1), 1952 (1–12). [Russ.]

The Minister of Forestry of the USSR outlines progress in 1951. Inter alia, dusting with BHC was undertaken on planting sites infested with cockchafer grubs and other root feeders; this enabled 10,000 ha. of such land to be planted. Successful tests were made of a new method for conserving soil moisture, by drawing furrows 20–25 cm. deep and 5 m. apart to catch additional snow on planting sites. New regulations were issued for the compilation of working plans intended to meet the Soviet economy's demands for forest products and to ensure the regeneration and preservation of the forests. Nest planting was definitely adopted as the standard method for Oak in the forests of European Russia and shelterbelts in the Steppe region. The policy of reducing fellings in wood-deficient regions and concentrating them in the most heavily timbered parts of the country was continued.

2529. MUSTAFAEV, M. G. Lesnoe hozjaĭstvo Azerbaĭdžana na pod'eme. [**The progress of forestry in Azerbaijan.**] *Lesn. Hoz.* 5 (4), 1952 (33–9). [Russ.]

A brief description of the forests of the Azerbaijan SSR (> 1,000,000 ha., or 11·5% of the total area) and their management. Various forest regions are distinguished: the slopes of the main ridge of the Caucasus are chiefly occupied by Oak, Beech and Hornbeam with various associates (Maple, Ash, Lime, Walnut, Chestnut, Pear etc.); the forests along the river Kura consist of various species of which the most important is *Morus*, which provides the bulk of the leaves for raising silkworms; the steppe zone is only sparsely wooded, but its woods provide shelter for the cotton and grain fields; the subtropical forests of the Lenkoran region contain a great variety of species, many rare or endemic, but the main timber species are Oak, Beech, Hornbeam and Elm. Owing to the mountainous character of the country the chief aim of management for all types of forests is to maintain their functions in soil and water conservation.

902. *History of Forests and Forestry*

See also Nos. 1548, 1798, 1841.

2530. HUTER, F. Die Haller Saline und ihre Bedeutung für Forstwirtschaft und Holznutzung des Landes Tirol. [**The Hall saltworks and their influence on forestry and timber consumption in the Tirol.**] *Forstwiss. Cbl.* 73 (5/6), 1954 (152–7). 6 refs. [G.]

A historical review of the development of the Hall salt industry, its fuel requirements and influence on forest conservation and exploitation in this region.

2531. Congrès de 1954 à Luxeuil. **[Congress [of the Société forestière de Franche-Comté] at Luxeuil, 1954.]** *Bull. Soc. for. Franche-Comté* 27 (3), 1954 (97–146 + 6 photos). [F.]

Includes descriptions of the forests of Haute-Saône and a paper: Three centuries of coppice-with-standards and conversion in Haute-Saône 1678–1954 (*Guichard*).

2532. Cointat, M. Le hêtre de Valbonne. **[The Valbonne Beech.]** *Rev. for. franç.* 6 (11), 1954 (657–61). [F.]

Concludes, on historical evidence, that the Beech woods of Valbonne (Gard) which have been thought to be a relict stand, are the result of planting in the 18th century.

903. *Forest Policy, General*

See also Nos. 1800, 2428, 2525–9, 2561–2.

2533. Vaux, H. J. **An economic viewpoint on Pacific Coast forest planting.** University of British Columbia, Vancouver, B.C. 1954. pp. 17.

The H.R.H. MacMillan Lecture in Forestry, 1954.

2534. Lamprecht, H., and Liscano, C. Problemas selviculturales en Venezuela. **[Silvicultural problems in Venezuela.]** *Bol. Ingen. for. Univ. Los Andes* 1 (4), 1954 (23–30). [Span.]

[Cf. *For. Abstr.* 15 (No. 3402).] The main objects of forest management in Venezuela are: to bring virgin forest under controlled management; to develop rational methods for forests already being exploited; to restore the over-exploited forests; and to reforest eroded areas. Brief recommendations are made for achieving these objects.

904. *General Regional Accounts of Forests and Forestry*

See also No. 2531.

2535. Collier, F. S. **The forest resources of the colonial territories and their management.** *Emp. For. Rev.* 33 (3), 1954 (221–7).

2536. **Forestry in Northern Ireland.** Ministry of Agriculture, Northern Ireland. [1954.] pp. 21.

An illustrated account.

2537. Stebbing, E. P. **[Review of *J. L. Reed*: 'Forests of France'.]** *Emp. For. Rev.* 33 (4), 1954 (362–5).

Cf. *For. Abstr.* 16 (No. 1288).

2538. **[Special number on Swiss forests and forestry.]** *Schweiz. Z. Forstw.* 105 (9/10), 1954 (497–583). [G.f.]

Contains a number of articles of a general nature on different aspects of Swiss forestry and forest policy.

2539. Mooney, H. F. **Some notes on forestry in Jordan.** British Middle East Office. 1954. pp. 17 + chart. Limited distribution.

2540. **Ryukyu Islands: forest situation.** *Special Bulletin, United States Civil Administration of the Ryukyu Islands* No. 2, 1953. pp. v + 123.

Presents findings of a land-use and forest-resource survey [see *For. Abstr.* 14 (No. 3634)], an account of pre-war and post-war developments in forest administration, detailed forest statistics and miscellaneous information, including a list of the most important native and introduced tree species. [Cf. *For. Abstr.* 14 (No. 3084).]

2541. Holsoe, T. **Forestry opportunities in the republic of Liberia.** Foreign Agricultural Service and Forest Service, U.S. Department of Agriculture, Washington. 1954. pp. 41.

A general account of forests and forestry.

2542. Rahm, U. La Côte d'Ivoire, Centre de Recherches tropicales—possibilités pour la participation suisse à l'exploration de la Côte d'Ivoire. **[Ivory Coast, a centre for tropical research: possibilities for Swiss participation in the exploration of the Ivory Coast.]** *Acta Tropica, Basel* 11 (3), 1954 (222–95). Many refs. [F.] C.G.B.

Notes on the setting up of a Swiss research centre in the Ivory Coast, with the collaboration of the French Office de la Recherche Scientifique d'Outre Mer, presenting also an outline of some of the main features of the geography, geology, climate, vegetation and ethnography of the country, including descriptions of the forests and savannas.

2543. Gooch, W. L. **Forest industries of the Philippines.** Bureau of Forestry, Department of Agriculture and Natural Resources, Manila. 1953. pp. 160.

An illustrated account, with sections on: forests and forest lands; timber concessions and forest licenses; primary forest products; secondary forest products; the Forest Products Laboratory; The Bureau of Forestry; The College of Forestry; forestry licenses; and grading rules.

905. *Forest Statistics and Resources*

2544. Saari, E. Wald- und Holzbilanzen. **[Forest and timber balances.]** *Acta for. fenn.* 60 (2), 1953 (1954). pp. 18. [G.fi.]

A note on the calculation of balance of growth and depletion for management purposes and on a national scale.

2545. **Forest resources of the world.** *Unasylva* 8 (3), 1954 (129–44).

Summarizes the preliminary results of the second world forestry inventory carried out by FAO in 1953. The detailed results will be published later.

2546. **World population conference: forest resources and population.** FAO, Rome. No. *FAO*/54/8/4667, 1954. pp. 10.

Gives some figures on forest composition and area and consumption of wood per head of population for Europe, U.S.S.R., N. America, Latin America, Africa, Asia, and the Pacific area.

2547. Macdonald, J. **British woodlands and their production—with discussion.** *Proceedings of the Technical Section, British Paper and Board Makers' Association (Inc.), Kenley* 33 (2), 1952 (337–50). L.S.

A review and discussion with tables showing: acreage of different types of woodland; high forest areas by age classes; principal species of the high forest (both coniferous and broadleaved); height quality classes of the main coniferous species; and volume of standing timber in 1950.

2548. **[Swiss forest statistics for 1952.]** *Schweiz. Forststatist.* 13 (3), [1954?]. pp. 34. [G.F.]

2549. Ilvessalo, Y. III valtakunnan metsien arviointi osoittaa käännettä Suomen metsävarojen kehityksessä. **[The third national forest survey indicates a change in the development of Finland's forest resources.]** *Metsät. Aikak.* 1954 (8), (267–72). [Fi.e.]

The survey, carried out in 1951–53, indicates a marked change, mainly favourable, in the country's forest resources. Growing stock and annual increment have increased considerably and the growing stock is composed to a greater extent of Spruce, and of large trees. [Tables and maps have English legends.] *From author's summary.*

2550. Metsätilasto: kertomus metsähallinnen toiminnasta VV 1951–52. **[Forest statistics: report on the activity of the State Board of Forestry in 1951–52.]** *Suomen Virallinen Tilasto* (*Ser. XVII*) No. 41, 1954. pp. 72. [Fi.sw.e.]

2551. McCormack, J. F., and Cruickshank, J. W. **Forest statistics for Georgia, 1951–53.** *For. Surv. Release Stheast. For. Exp. Sta.* No. 44, 1954. pp. 77.

907. *Indirect Significance of Forests* (*Rural Amenity, National Parks, Forest Influences etc.*)

See also section 116 and Nos. 1343–4, 1545, 2571.

2552. Packard, F. M. **National parks—the citizen's responsibility.** *Oryx* 2 (6), 1954 (352–6).

The executive secretary of the National Parks Association of the U.S.A. writes on the protection required against pressure groups, the work of voluntary associations, the inadequacy of federal finance to cope with the 47,000,000 visitors, the deteriorating roads, the important though proportionately small vandalism, in what is considered (by its effect on associated industries) the fourth largest enterprise of the nation.

2553. Koziol, F. C. **Problems of winter use on forest lands.** *J. For.* 52 (11), 1954 (819–23).

The problems involved in the use of forest lands for winter sport in the U.S.A. are illustrated by experience at Alta (Wasatch National Forest). Points requiring consideration are:—advance study of weather and hazards (avalanches); sanitation; administration and safety programme; access roads and snow removal; development agency and finance; and improvement of ski-trails. Alta claims to be the first avalanche research station outside Europe. Continuous studies there cover a decade. [Cf. *For. Abstr.* 12 (No. 2604).]

91. LAND USE, LAND-USE POLICY (INCLUDING AFFORESTATION POLICY)

See also Nos. 1378–9, 2559.

2554. Numéro consacré au problème de l'équilibre agro-sylvo-pastoral. **[Special number devoted to the balance of agriculture, forestry, and pastoral husbandry.]** *Rev. for. franç.* 6 (12), 1954 (717–825 + 37 photos + 8 maps). [F.]

Contains the following: The problem of agro-sylvo-pastoral balance (*P. Guinier*); The search for equilibrium in the mountains (*P. Veyret*); The management of the Durance valley (*J. Boutière*); The influence of relief in the study of pastoral problems in the Pyrenees (*P. Chabrol*); Balanced land use in the Mediterranean garigue (*G. Kuhnholtz-Lordat, P. Renaud* and *J. Bany*); The establishment of a balance between agriculture and forestry in the Causses of Quercy (*A. Linguet*); Balanced land use in the Jura (*E. Lachaussée*); Balanced land use in the chalk areas of Champagne (*P. Duchaufour*); The search for balanced land use in Brittany (*G. de Gonneville*); Balanced land use in the *landes* (*G. Siloret* and *J. Guinaudeau*); Balanced land use in the Pays Basque (*M. Barriéty*).

2555. Tömpe, I. Példaképünk a Szovjetunió szocialista erdögazdasága. **[Socialist forestry in the USSR as a model for Hungary.]** *Erdö* 1 (3/4), 1952 (169–76, 308,315). [Hu.russ.f.]

A general review of the various problems in Hungarian forestry that are being tackled on the lines of Soviet practice. The afforestation target under the 5-year Plan was 570,000 *hold*, inclusive of areas cleared in the past and being currently cleared. To provide enough young trees for planting, the nursery areas need to be increased under the Plan from 2600 *hold* to 6600. By ministerial order of 24 August 1951, some 56,274 ha. of floodland are to be afforested, strips of forest being planted on the Soviet model to a length of 1047 km. along the main Hungarian rivers. Some 80% of these strips will serve to increase the area of alkali soils under forest. The key points in the programme are the planting of quick-growing species, to increase the supply of industrial timber, and the planting of conifers, the area under which is to be quadrupled.

Since 1951 the SZLCS-1 tree-planting machine has been in use in Hungary. This is tractor-drawn and moves at 2·5–3 km./hour. To be fully effective it must be used on well prepared soil; it is best on loam or moderately compacted soil, but may also be successfully used on sandy soils of the Szabaszállás type, where first experiments showed that 1500 trees/hour could be planted, compared with 200/hour by 4 men planting by hand. Thus the machine was 8–10 times as quick. Naturally this result has been improved upon with practice.

The Soviet KT-12 tractor [cf. *For. Abstr.* 11 (Nos. 1162–64] has also been introduced. It was found difficult to operate at first in Hungarian conditions, but by autumn 1950 it could handle up to 70 cu.m./8-hr. day, i.e. was 8–10 times as effective as a team of two horses. This tractor can also be used for uprooting standing trees or stumps, and in the Soviet Union experiments are in progress to adapt it for loading, by fitting a crane.

2556. Osipjan, L. G. Zadači lesnogo hozjaïstva Armenii. **[Forestry problems in [Soviet] Armenia.]** *Lesn. Hoz.* 5 (4), 1952 (40–3). [Russ.]

The main problem is to afforest the land created by the silting up of Lake Sevan and the 118,450 ha. of badly eroded land in the Sevan basin. Afforestation has already been started and, by 1960, 10,000 ha. are to be planted, mainly with Oak, Pine, Elm, Ash, other timber species and wild fruit trees. To provide planting stock new nurseries will be established, as

locally grown seedlings have shown considerably higher survival than those imported from other regions.

2557. Zum Problem der Aufforstung in Kolumbien. **[The problem of afforestation in Colombia.]** *Int. Holzmarkt* 1954 (13), (4–5). [G.]

A brief account of afforestation carried out since 1948 by the Forest Service.

2558. LAWRIE, J. J. **Acacias and the Somali.** *Emp. For. Rev.* 33 (3), 1954 (234–8). 7 refs.

The nomadic Somali are dependent upon the Acacias to feed their stock and supply many of their own needs. The country, rising from sea level to over 7000 feet, has few resources other than precarious grazing for the camels, goats, and sheep which form almost the only wealth of the people. Acacias provide the framework of the portable houses, charcoal, rope, browse, fencing, and numerous other necessities. This leads to enormous pressure on the vegetation, which is not at present holding its own. Unless a system of pasture management is introduced the grazing will continue to deteriorate. *Author's summary.*

92. FOREST OWNERSHIP AND OWNERSHIP POLICY

See also No. 2428.

2559. POLI, A., and BAKER, H. L. **Ownership and use of forest land in the Redwood/Douglas Fir subregion of California.** *Tech. Pap. Calif. For. Range Exp. Sta.* No. 7, 1954. pp. 76. 17 refs.

2560. BENČAŤ, F. Vývoj rezervácií na Slovensku a ich význam pre lesné hospodárstvo. **[Development of forest reserves in Slovakia and their significance for forestry.]** *Les, Bratislava* 1 (7/8), 1954 (19–24). [Slovak.]

By the end of 1953, the area of forest reserves in Slovakia was ca. 68,000 ha. The history and geographical distribution of these reserves are described.

2561. Rapports sur la 'petite forêt': Luxembourg. **[Reports on 'small woods': Luxembourg.]** [*Docum.*] *European Forestry Commission, 7th Session, 1954* No. *FAO/EFC/70–D*, 1954. pp. 6. [F.] Limited distribution.

2562. **Reports on 'small woods': Norway.** [*Docum.*] *European Forestry Commission, 7th Session, 1954* No. *FAO/EFC/70–B*, 1954. pp. 6.

Some statistics of area, ownership etc., and discussion of policy for the management of farm woodlands, which make up 48% of the total forest area of Norway. The average size of these woodlands is ca. 27·3 ha.

93. PUBLIC SUPERVISION AND REGULATION OF FORESTRY, INCLUDING LEGISLATION FOR THESE PURPOSES

2563. FRASSOLDATI, C. Alcune osservazioni sulle norme penali della legge forestale. **[The penal clauses in the [Italian] forest law.]** *Ital. for. mont.* 9 (5), 1954 (244–9). 8 refs. [It.it.f.]

The penal clauses of the 1923 forest law have not been brought into line with the current penal code. The author examines the more important of them and indicates what civil sanctions are applicable to these offences.

2564. **An ordinance (No. 15 of 1953) to consolidate and amend the law relating to forests [in British Guiana].** *Food agric. Leg.* 3 (1), 1954. pp. 10.

94. OTHER METHODS TO IMPLEMENT FOREST POLICY

2565. **Panel on public relations and education [in relation to forestry in Canada].** *For. Chron.* 30 (3), 1954 (258–73).

Contains 3 papers with discussions: Professional forestry education in Canada (*J. B. Millar*); An industrialist's concept of government's part in forestry (*B. F. Avery*); and A government forester's concept of industry's role in forestry (*G. W. I. Creighton*).

941. *State Subsidies etc.*

See No. 2077.

943. *Forest Insurance*

2566. SHEPARD, H. B. **Will forest fire insurance work?** *Amer. Forests* 60 (10), 1954 (20–1, 47–9).

Discusses advantages, difficulties and possibilities in the U.S.A.

945.1. *Advisory and Information Services. Documentation Centres*

2567. CAÑEDO-ARGÜELLES Y QUINTANA, E. DE. Labor de nuestro Cuerpo Superior Consultivo durante su primer siglo. **[The work of our Superior Advisory Council during its first century.]** *Montes, Madrid* 10 (58), 1954 (243–51). [Span.]

History and past and present functions.

2568. KITCHINGMAN, G. D. **The problem of finding the information you want.** *Quart. J. For.* 48 (4), 1954 (277–80).

A note on forestry documentation with particular reference to the older English literature and the means of making it accessible.

945.2. *Publicity, Propaganda (including Demonstration Forests)*

2569. KLEPAC, D. O šumskoj proizvodnji u fakultetskoj šumi Zalesini. **[Forest production in the Zalesina forest [estate of the Forestry Faculty, Zagreb].]** *Glasn. šumske Pokuse* 11, 1953 (181–238 + 8 tbls.). 58 refs. [Croat.croat.f.]

945.3. *Education. Training*

See also Nos. 2543, 2565.

2570. KER, J. W. **Forest research at the University of British Columbia.** *Repr.* from *Northw. Sci.* 28 (3), 1954 (107–15). 11 refs.

2571. DILS, R. E. **Status of college instruction in forest influences and watershed management.** *J. For.* 52 (10), 1954 (727–9). 3 refs.

Of the 25 accredited U.S. forestry schools, 17 now offer instruction in these subjects, with lectures

ranging from 2–4 and laboratory work from 0–3 hours per week.

945.4. *Research*

See also Nos. 1476–7, 1597, 1778, 2104, 2318, 2341, 2383, 2387, 2390, 2542–3, 2570.

2572. **Study of woodlands.** *Rep. Nat. Conservancy, Lond. 1953/54*, 1954 (7–10).

A summary account of work carried out by the Nature Conservancy in co-operation with the Forestry Commission, on soil conditions in relation to tree species: nutrient demands, rates and styles of growth, role as soil improvers, effects on herbage and litter, and characteristics in deflecting or intercepting sunlight or rain, and the application of the results of these fundamental studies to silvicultural management. [Cf. *For. Abstr.* 15 (Nos. 2212, 2234).]

2573. JAMBLINNE, A. DE, and HUYGH, A. Le Centre de Biologie Forestière de Bokrijk. Historique, but pratique et moyens d'action. **[The Forest Biology Centre at Bokrijk: history, objects and methods.]** *Bull. Soc. for. Belg.* 61 (8/9), 1954 (374–85). [F.]

2574. MÉTRO, A. Les sciences forestières et la sylviculture au Maroc. **[Forest sciences and silviculture in Morocco.]** *Repr.* from *Bulletin de l'Enseignement Public au Maroc, Rabat* Spec. no., 1954 (25–38 + 5 photos). [F.]

Outlines forest research and ancillary facilities in French Morocco, dealing mainly with natural regeneration and the planting of exotics, and pleads for more money and staff. The forests (Cedar, deciduous, evergreen and Cork Oaks, Maritime and Aleppo Pines, *Argania*, alfa grass) cover > 4 million ha. (17% of the area), support directly and indirectly 1½ million people, and provide the range for ca. 8½ million beasts of which a half are goats.

2575. BUCKLAND, D. C. **Research? or re-search?** *B.C. Lumberm.* 38 (10), 1954 (44 . . . 46).

Notes on the work of research bodies in British Columbia, important subjects neglected, lack of co-ordination, and mis-directed effort, and a plea for the setting up of an advisory board similar to that in Ontario.

946.2. *Conferences and Excursions*

2576. Bois et forêt: Actes officiels du Congrès national du Bois: Session de synthèse. **[Proceedings of the [French] national timber conference, final session.]** Cie. Française d'Éditions, Paris. 1954. pp. 176. [F.]

[Cf. *For. Abstr.* 16 (No. 1331).] The final session (held in March 1954) consisted of discussions of a general nature and the passing of resolutions (given in this volume).

2577. **Proceedings of the 4th American Forest Congress, October 29, 30 and 31, 1953.** American Forestry Association, Washington D.C. 1953. pp. 372. Price $3.

Papers and discussions of a general nature arranged under the following sections: general aims; forest management; multiple use of forest lands; forestry research and education; forest ownership.

96. FOREST LABOUR QUESTIONS. LABOUR QUESTIONS IN WOOD TRANSPORT AND THE WOOD INDUSTRIES

2578. HEIKINHEIMO, L. Metsätyövoiman tutkimusmenetelmä. Maaseudun työvoiman tutkimuksia. I. **[Method of surveying forest labour. Finnish rural labour force studies I.]** *Repr.* from *Acta for. fenn.* No. 63, 1954. pp. 182. 100 refs. [Fi.e.]

A detailed account of the methods (including statistical analysis) employed in a survey of forest labour made in 1950. All tables have English as well as Finnish legends.

97. INTERNATIONAL FOREST POLICY AND OTHER INTERNATIONAL COLLABORATION

971. *Congresses, Conferences*

2579. **Report of the Second Session of the International Chestnut Commission (Spain and Portugal, June 1953).** FAO, Rome. No. *FAO/CH*/11 Rev. 1, 1954. pp. 57. [E.]

Includes the following papers: Report of the study tour in Spain (*H. Millischer* and *J. Elorrieta*); Chestnut in the province of Tras-os-Montes (*C. Taveira Fernandez*, and *A. Biraghi*); Report of the study tour in Western Spain (*P. Urquijo Landaluze*); and Control of the Chestnut ink disease in northern Portugal (*C. Taveira Fernandez*).

References: 1. *Activities of FAO under ETAP 1953/54*, Rome; 2. *American Nurseryman*, Chicago; 3. *Bois et Scieries*, Paris; 4. *Bulletin*, Bonn; 5. *Forestry Commission Press Release*, London; 6. *Forêts de France*, Paris; 7. *F.P.R.S. News Digest*, Madison; 8. *India News*, London; 9. *Lesnoe Hozjaĭstvo*, Moscow; 10. *Pulp and Paper Magazine of Canada*, Gardenvale, Que.; 11. *Schweizerische Zeitung für Forstwesen*, Berne; 12. *Scottish Forestry*, Edinburgh; 13. *Times*, London; 14. *Unasylva*, Rome; 15. *Wood*, London; 16. *Monthly Bulletin of the Iranian Forest Service*, Teheran.

International.

FAO. Asia-Pacific Forestry Commission Third Session 9–21 April, Tokyo.

Near East Forestry Commission First Session 24–29 September, Teheran.

FAO/ECE Conference on Forestry Statistics, September, Geneva.

International Chestnut Commission, September, Rome.

FAO/International Union of Forest Research Organizations Committee on Bibliography, September, Freiburg.

Latin America Forestry Commission 5th Session, September, Venezuela.

European Forestry Commission 9th Session, 10–15 October, Rome.

Other. International Union of Biological Sciences, 12th General Assembly, 12–15 April, Rome.

American Association for the Advancement of Science International Arid Lands Symposium and Conference, 26th April to 2nd May, Socorro and Albuquerque (N. Mexico).

International Poplar Commission, 3–6 May, Madrid.

Commonwealth Agricultural Bureaux Review Conference, 8 June to 7 July, London.

Symposium on the Biological Sciences, 4–8 July, Sao Paulo, Brazil.

Symposium on Geographical Factors in the Development of Tropical Africa (Food and Population Land Use Survey), 10–20 September, Kampala (Uganda).

ECE Timber Committee, October, Geneva.

ILO Committee on Work on Plantations Third Session, Autumn, Geneva.

Abyssinia. An FAO forestry expert undertook a preliminary assignment in 1951–52, during which he drew up a forestry law, which has been adopted by the Government, and assisted in forming the nucleus of a forest service. He is continuing to assist in the establishment of forest nurseries in which a number of exotic species, especially from Australia, are being tested (**1**; December 1954).

Brazil. The FAO mission for advising on forestry etc. is now administratively attached to the Commission for the Development of the Amazon Valley, which is to receive 3% of the national, state, and municipal revenues for 20 years from the coming into force of the new constitution. A logging and exploitation demonstration centre has been set up near the Peruvian border in a region typical of the upper Amazon. A sample inventory is being taken in the state of Para, and the aerial survey is now complete (**1**; December 1954).

Canada. A Canadian Institute of Timber Construction has been formed at Ottawa. Its objects are: (1) To standardize constants of size, quality, and terminology, and to develop practical tools for architects and engineers. (2) To promote a code of behaviour for the industry. (3) To encourage a high standard of workmanship and eliminate "under-engineered designs." (4) To disseminate literature and standards. (5) To encourage legislation and regulation for the protection of the building industry as a whole. (6) To promote equitable fire regulation. All firms engaged in production of timbers for engineering constructions or whose principal business is the designing, assembly, or erection of such constructions, are eligible for membership (**7**; January 1955).

Marquette Products Ltd., 25 Courcelette St., Quebec, is offering a 40% Na arsenite compound, "Bark-X," for bark removal by chemical girdling. It is claimed that it reduces pitch [resin] accumulation in the wood, has a low evaporation, will freeze only at very low temperatures and acts as an animal repellent (**10**; February 1955).

China. The Chinese Government is giving considerable attention to the restoration of forests and to the development of forestry in general. At present the forest area amounts to only 6·8% of the total area of the country, 72% of the forests being in State ownership. A Central Ministry of Forestry was set up in 1950, which plans to bring 50% of the forests under sustained yield management by 1957. Fire protection has been greatly helped by the response of the people, who have formed a voluntary fire-preventing organization with more than one million members. Two Forest Research Institutes and 6 Forest Experiment Stations have been opened, and there are also 1062 nurseries with a total area of 30,000 ha. Three Forest Academies and 11 Forestry Departments in existing Universities have been established, at which 3,000 students are being trained; there are also 12,000 students attending technical schools to train as forest ranger technicians. A Forest Industry Department has been organized within the framework of the Ministry of Forestry (**9**; January 1955).

As a result of the exploitation of the Pine forests of Sungkiang province (Manchuria), the village of Ichun has grown to a town of 190,000 inhabitants in the last 5 years and become the centre of the timber industry of the region. Recent constructions include a power station, a large sawmill, and tractor repair shops, and a number of light industries have been set up. A light railway connects Ichun with the forest, and logging is completely mechanized (**9**; April 1954).

France. A new society, "Le Feuillu Français de Papeterie" has been founded in Paris. Its objects are: to promote the planting of hardwood species suitable for pulping in France and the encouragement of such species in existing woodlands, and to ensure the use of such woods in papermaking (**6**; January/February 1955).

Germany. A mobile apparatus has been developed for providing the soil of parks with natural fertilizer. It rakes together the autumn leaves, pulverizes them, and scatters them over the ground again. The machine seats one person and is about the size of a large lawn-mower (**4**; 24.2.55).

The chief disadvantage of fibreboards—their high inflammability—is said to be overcome by a new type of fire-proofing agent, applied as a paint to both sides and all edges of fibreboards. Under the influence of heat, the coating is transformed into a solid foam-like mass, preventing the access of oxygen to the board. The board itself may disintegrate under the influence of great heat, but the inflammability of the escaping gases is reduced by the foam, and even if they ignite, they burn the foam and not the board (**11**; December 1954).

Great Britain. An agreement made in 1936 between the Forestry Commission and the Council for the Preservation of Rural England has been modified so as to permit a limited amount of additional tree-planting in the Lake District by the Commission. The original object of maintaining the hardwood character of the Lakeland woods will still be pursued in the Commission's treatment of any land they acquire (which must have been under timber trees in 1936), but to this end some temporary softwood planting may occasionally be necessary (**5**; 17.12.54).

Steeplejacks are searching for a solution to the recurring attacks by woodpeckers on shingled church spires. Some spires in Kent, Essex and Hertfordshire have been so riddled with holes that hundreds of pounds will have to be spent on their repair. The damage is done by the green woodpecker, which appears not to have attacked shingled roofs before about 1949. Inquiries are being made by the National Federation of Master Steeplejacks, who have questioned the custodians of 30 churches with shingled spires, of whom 20 reported that their spires had been attacked. The favourite month for attack is March, and Oak and Cedar are equally attacked. The current theory is that the birds are searching for the flies that shelter under the shingles. It is observed that 17 out of the 20 damaged spires are situated in farming districts where chemical control of pests has been freely practised, killing myriads of insects. Woodpeckers, therefore, may have taken to looking for food in shingled spires because there has been a shortage of food on the ground. It is to be noted that the 10 churches that report no attack are ventilated at the eaves and wired against birds; only 5 are in pest-control areas. Nearly all the damaged spires have no windows or ventilation at the eaves (**13**; 14.2.55).

The Forestry Commission has installed a V.H.F. radio system to facilitate fire-fighting operations in the Thetford Chase area. The installation comprises a fixed station, two mobile transmitter/receivers mounted in Land Rovers and 4 portable pack sets (**15**; February 1955).

The Forestry Commission announces that payment for grey squirrel tails, which was originally introduced for a two-year period ending in March 1955, will continue for a further year (**5**; 18.1.55).

As part of a plan for using home-grown conifer thinnings in building houses, a prototype building largely constructed of thinnings has been erected by the Forestry Commission at Santon Downham, Suffolk. The species used were Spruce, Larch, and Pine. The problems involved are, from the forestry point of view, to provide new uses for small, sappy timber in short lengths and small sizes, and,

from the building point of view, to devise a system of construction that could be widely and easily applied. The reaction to the second of these problems was to design panels that could be easily prefabricated and hung on timber frames. All the panels are based on a modular dimension of 40 in. Tests with the trial building will take about a year. Its durability and fire-resisting qualities are assured (**13**; 14.1.55).

A chipboard factory, the first of its kind in Scotland, is being set up at Annan by the manufacturers of 'Wayroc'. Up till now, 'Wayroc' has been made of wood-waste from sawmills and woodworking plants, and the factory at Annan will be the first in the United Kingdom to make use of thinnings as raw material. Supplies will be drawn from woodlands within a radius of ca. 30 miles. The factory is expected to be in full production by August 1955 and to use ca. 500 tons of thinnings per week, to produce 200 tons of 'Wayroc' (**12**; January 1955).

India. The first national newsprint factory, at Nepanagar (Madhya Pradesh), went into production on 14 January with imported chemical pulp, but the intention is ultimately to base the project on utilization of chemical pulp from home-grown Bamboo and Salai [*Boswellia serrata*] wood. Salai has hitherto had no use (**8**; 15.1.55).

The Drug Research Laboratory at Jammu, established in 1941, has collected and preserved for exhaustive study 1700 of the estimated 2000 medicinal plants in India. The laboratory has 3 divisions: Botany, Chemistry, and Microbiology. With the help of the Kashmir State Forest Department, the Laboratory cultivates various medicinal plants; it also manufactures several vaccines and meets the entire needs of the State's hospitals and private dispensaries. The library contains 9000 reference books on pharmacological research and allied subjects (**8**; 12.2.55).

Indonesia. Considerable expenditure has been undertaken by the Government in the development of improved forest extraction methods and for the establishment of forest industries: 3200 km. of forest railways have been constructed in Java, mainly for the extraction of Teak, and a quantity of tractors and other heavy equipment have been bought (**1**; December 1954).

Jordan. In connexion with the establishment of a forest ranger school in the Near East, two FAO experts are paying short visits to the country, while a forest ecologist is assisting the Department of Forestry in the preparation of an ecological map of the country (**1**; December 1954).

Philippines. A team of FAO and United Nations experts have been investigating the prospects for expansion of the pulp and paper industry in the Philippines. The most promising materials are sugar-cane bagasse, rain-forest wood, and abaca plantation waste (**14**; December 1954).

Persia. A special section for the administration of pasture lands has been set up within the Forest Department. This section takes over the functions of the former Committee for the Improvement of Pasture lands which had drawn up comprehensive plans, for implementation during the current year with the aid of the American Economic Mission. Courses in pasture management have also been started for forest officers.

A forest committee has been appointed to formulate a comprehensive programme for creating wind-breaks against blowing sand and for general amelioration, throughout the country.

Two hundred *Ficus* and *Quercus persica* have been sent to India to be planted in Mahatma Gandhi's memorial garden (**16**; 1954)

Spain. As a measure to control excessive planting of fast-growing forest species on private land that could otherwise be given over to agriculture, the government has decreed that in the provinces of Navarra, Guipuzcoa, Biscaya, Santander, and Asturias, an authorization must be obtained before establishing plantations of *Pinus pinaster*, *P. radiata*, *Eucalyptus* spp., *Acacia* spp. or Poplars, on private land. Requests to establish plantations of these species are examined by the provincial forestry and agricultural authorities and, in the event of disagreement, submitted to their respective ministries for a decision. Where a request is refused, the land must be put into cultivation. In irrigated areas where it is desired to encourage settlement, plantations of fast-growing species may be established on land not suited to agriculture, or on an area not exceeding 5% of the total land area of any particular property, or as hedges and shelterbelts (**14**; December 1954).

Syria. Assistance is being given by FAO in the preliminary steps which the Government is taking to conserve the remaining forest resources of the country. The forests are diminishing rapidly and, as a first step towards their conservation, an expert has undertaken to survey and demarcate the Forest of

Latakia in order to control existing rights and protect the forest against further abuse. A new forestry code has been drawn up and is under consideration by parliament (**1**; December 1954).

U.S.A. The superintendent of grounds at Michigan State College has found a new use for the mist-blower originally purchased to spray the campus trees. He makes use of the air blast of 120 m.p.h. to blow leaves into piles or windrows. The machine is especially useful in clearing leaves from under shrubs and low-hanging branches where it is difficult to rake. Once the leaves are piled, they are loaded into trucks, using either a mechanical hoist and packer, or a suction machine. All leaves are composted and used to mulch the garden beds. Using the mist-blower, two men can accomplish what formerly required a crew of 20–30 men. The machine is expected to prove equally efficient in removing loose snow from the campus walks, drives and parking areas (**2**; 1.1.55).

The manager of a sawmill in Indiana watches operations in the mill over a closed-circuit TV set while working in his office. A TV camera sends a picture of the carriage and mill to the side of his desk (**7**; January 1955).

U.S.S.R. The felling since 1939 of large areas in the protective forests of the upper Lena catchment in Siberia, chiefly on account of their accessibility, is one of the causes of the silting of the river bed. In the summer of 1953 steamers were unable to go further up the river than Vitim. Since the Lena is the main waterway of the Yakut SSR any deterioration in its navigation conditions can imperil the annual transport plan (**9**; November 1954).

Pinus koraiensis, *P. sibirica*, and *P. strobus* have been successfully grafted on *P. sylvestris* at the Ivanteevka Selection Station of VNIILH. The object of the experiment was to find a means of improving the extremely slow growth of *P. koraiensis* and the resistance of *P. strobus* to blister rust (**9**; May 1953).

In the forests of the Finno-Karelian SSR, protective belts from 0·5 to 1 km. wide have been established along the main navigable rivers and lakes, and existing ones widened. The object is to prevent bank erosion and waterlogging, to retard snow-melt and thus regulate stream-flow and serve as barriers against arctic air currents. Protective belts will be subject only to regeneration and cultural fellings carried out in accordance with the advice of the research institutes of Leningrad and Moscow (**9**; May 1953).

Successful trials were carried out in August 1954 in the use of a helicopter for dropping fire-fighting teams and equipment at the scene of a forest fire without landing. The helicopter carried a 15-m. flexible ladder, a winch capable of lowering and lifting (to a height of 15 m.) loads of 250 kg., and standard fire-fighting equipment. In the trials, the helicopter hovered at a height of 5–12 m. from the ground, the most skilful man descended first and kept the ladder vertical by his weight, followed by the rest of the team. The mechanical equipment was placed in a hammock and lowered by the winch, and the trenching tools and hose were simply dropped to the ground. Further trials are to be made in the use of helicopters for extinguishing small fires in mountain areas by spraying chemicals from the air (**9**; December 1954).

Chestnut (*Castanea sativa*) stands on the Black Sea coast are suffering from rapid and severe dieback which kills the trees in 2–3 years. The pathogen has not been identified but may be *Endothia parasitica* (**9**; August 1953).

The use of compressed wood of Willow and Poplar as a substitute for Oak or Beech in the manufacture of wheel rims, has been found satisfactory at the Novomoskovsk wagon-building works. Pieces of wood cut to suitable dimensions are steamed for 40 minutes at a pressure of 1·5 atm., passed through a press in which they are compressed from 95 to 60 mm., and bent to the desired shape. The cost of a compressed Willow or Poplar rim is less than half that of an Oak or Beech one (**9**; November 1953.)